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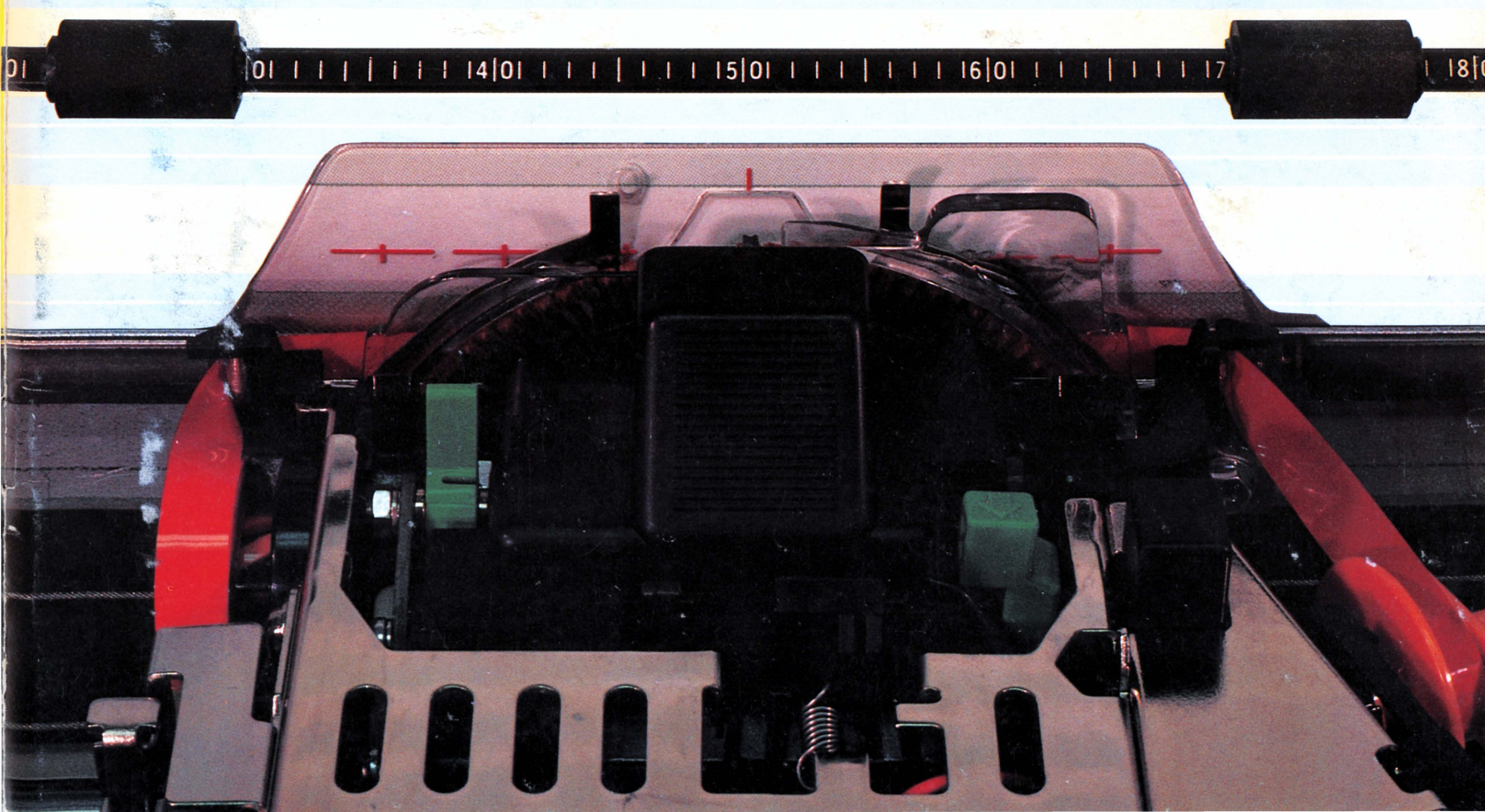

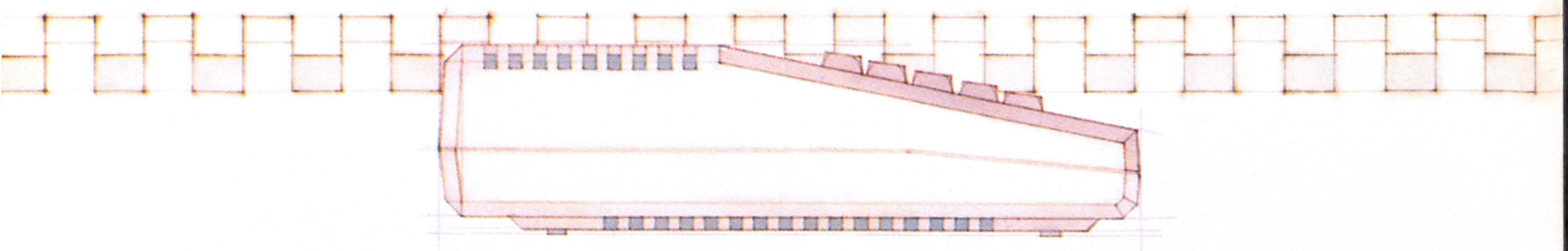

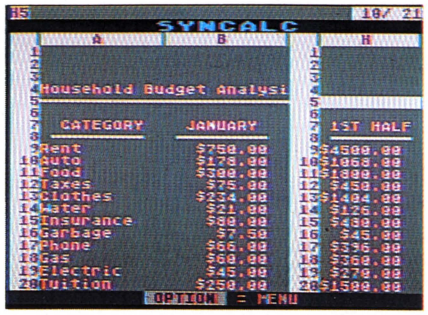

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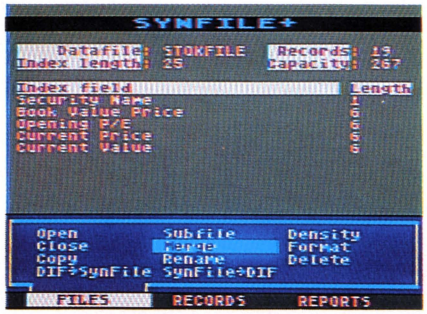

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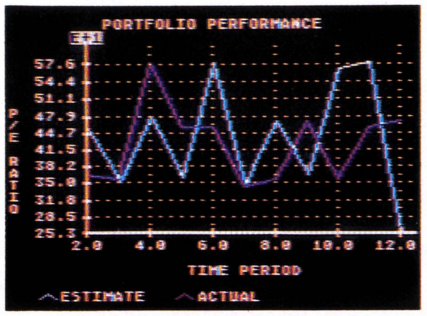

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THE MAGAZINE FOR ATARI® COMPUTER OWNERS

ANALOG COMPUTING

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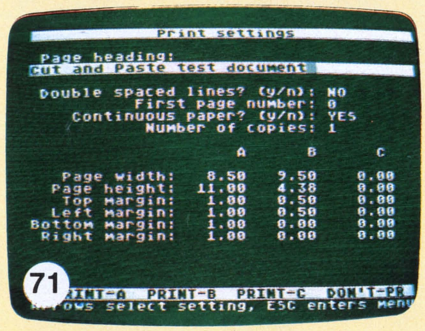

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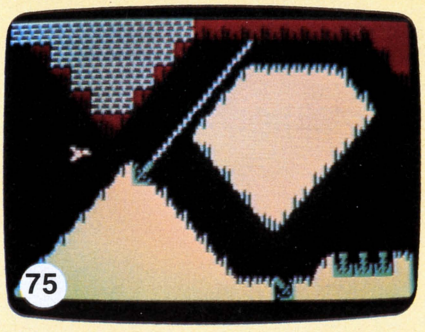
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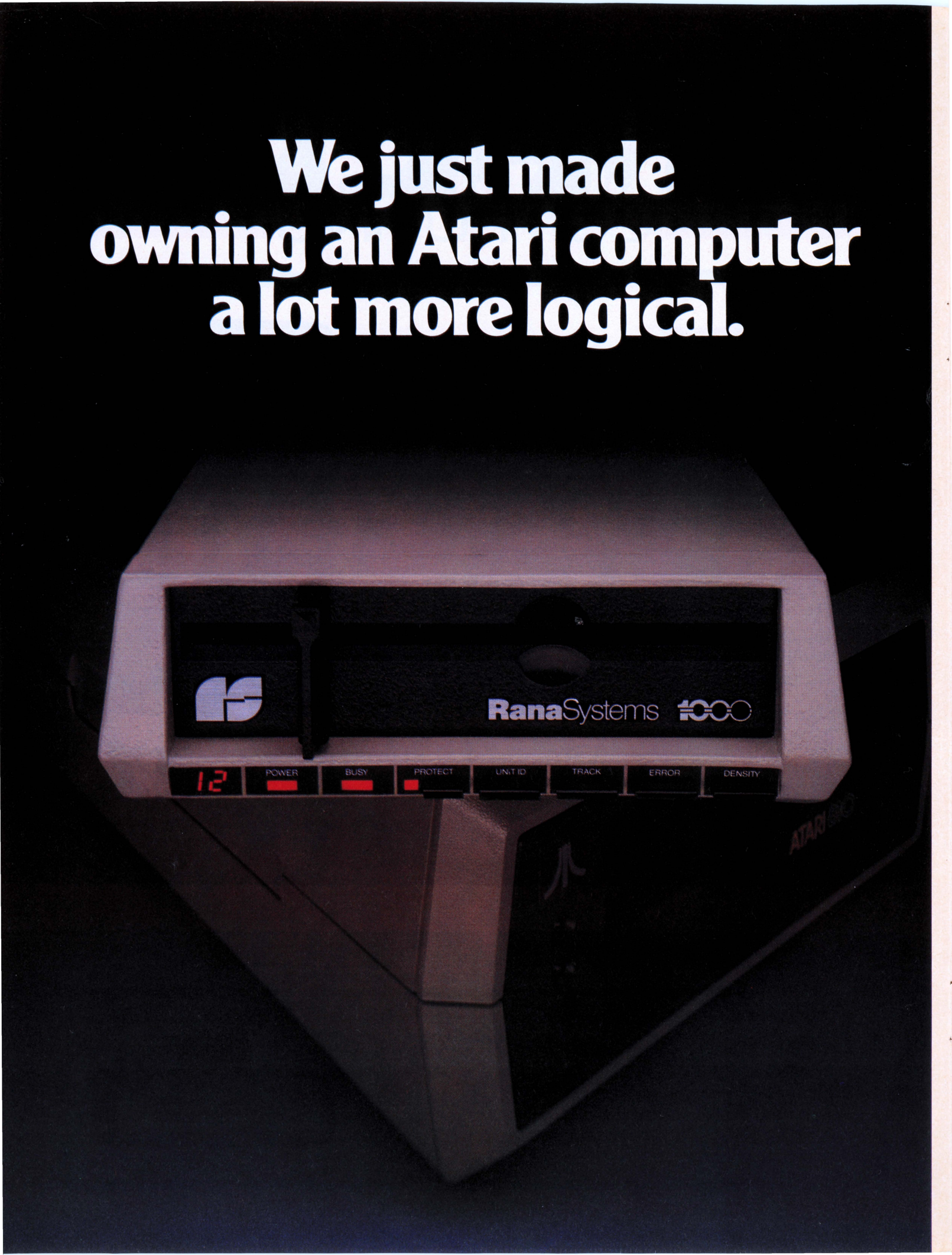

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Why even stylewise our new low profile design not only looks 100 times more spectacular, but it occupies 3 times less space. And our new Rana 1000 also gives you a piece of its mind every time you use it, because our disk drive gives you information as well as takes it. And we think that says a lot.

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READER COMMENT

In your issue 19, page 46 Bulletin Board Systems article, for P.A.C.E. (Pittsburgh Atari Computer Enthusiasts), you have the wrong BBS phone number. The correct number is (412) 754-0800. We've had this number for at least one year. It *was* great to see our club in your listing of BBSs!

Sincerely,
Evan Chapkis.

Our apologies, Evan — and those of you who tried to call the incorrect number we had listed. So. . .don't call P.A.C.E. at (412) 655-2652! It's (412) 754-0800.

We also have been informed that the number we gave for the Jersey Atari Computer Group (issue 19, page 47) was really Earthrise Computers (a store, not a BBS). To date, we have not received a number for that Jersey group, but please don't call Earthrise expecting to find a BBS.

—Ed.

BBS moves.

I would like to take this opportunity to thank you for publishing my BBS in your article. The BBS and I have moved recently, and the new telephone number is: (703) 550-8119. The **Best Little BBS** is restricted to adults only but does support any and all types of computers.

A forwarding telephone number was *not* given to the telephone company, to help enforce the adults-only policy. Alternatively, I had left broadcast messages to all my users to inform them of the new telephone number.

Sincerely,
Monica, the Sysopette
Alexandria, VA

Sysopette? Sysoptrix? Sysopenova?

—Ed.

800XL memory test problems.

Upon unpacking my new 800XL and setting it up, I proceeded to run the built-in memory test. To my dismay, one of the RAM blocks turned red, which supposedly indicates a problem. This was, however, the only time this happened. I periodically run the test, and all RAM displays normal. I have had no problems with the unit, and entering ?FRE(0) returns 37,902 bytes free — which is normal. What happened? The owner's manual states that, when performing the memory test, 48 RAM blocks should appear. It even shows a drawing of what the screen should look like. My unit, as well as all the others I've tested, shows only 40 blocks. I'm confused!

Lastly. . .Why is it that, when I have a DOS3 formatted diskette (with FMS.DYS) in my 1050 drive and enter the DOS command, the built-in function test runs? Shouldn't I get the DOS menu after booting?

Sincerely,
Sandro V. Cuccia
Wilmington, DE

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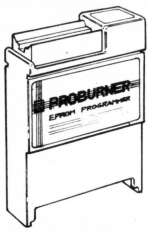

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only shows 40 blocks, though. The 800XL has BASIC built into it. This BASIC uses up 8K of memory space, and, when the computer is first powered up, it thinks it has only 40K of contiguous RAM. You can disable BASIC by turning on your machine while holding down the OPTION key on the side. It should now jump directly into the self test routine, and a memory test now will show 48K of memory.

As for your DOS3 problem, I'm afraid that we have had very little experience with it. The situation that you describe sounds as if the DOS did not, in fact, boot up from the disk. . . because, if you type DOS on an XL computer that is not connected to a disk drive, it will go into the self test routine instead.

I hope that this has been of some help to you. Please feel free to contact us again if you encounter any further problems.

—CB

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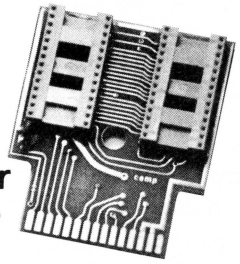

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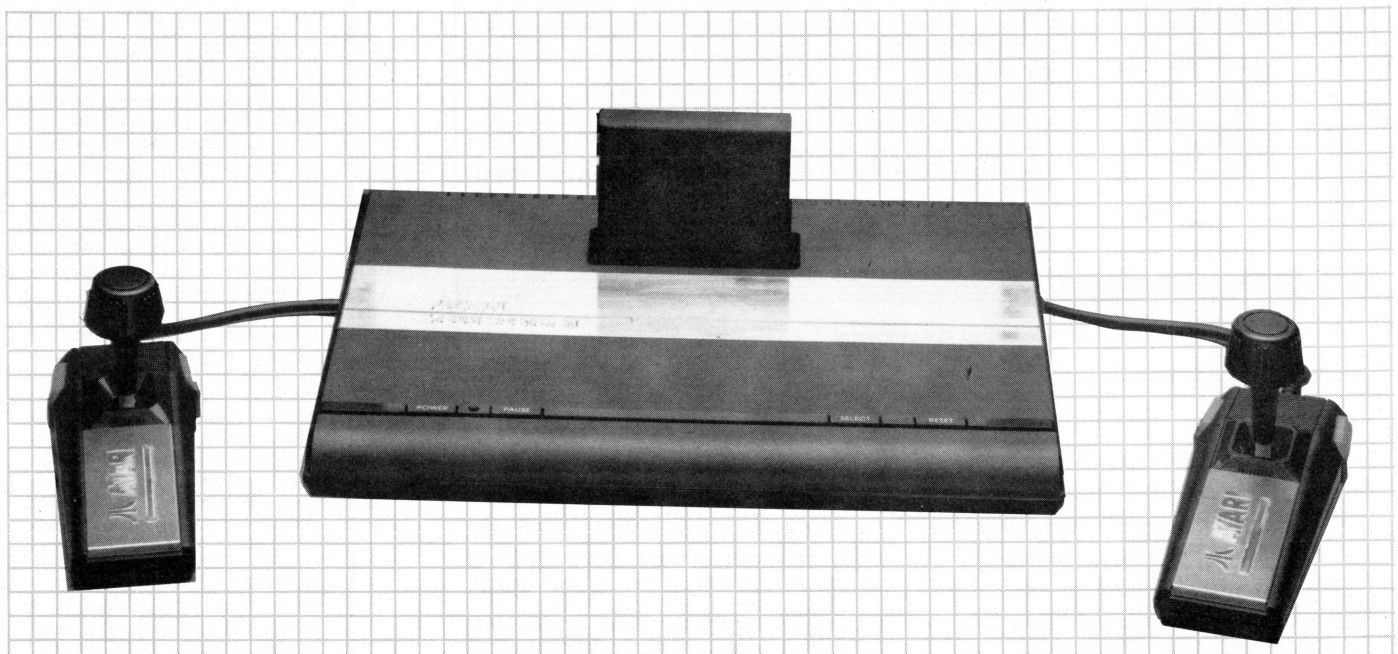


The Atari 7800 ProSystem

by Arthur Leyenberger

Atari has been fairly quiet during the first four months of 1984. In January, at the Winter Consumer Electronics show in Las Vegas, Chairman of the Board and Chief Executive Officer James Morgan stated that Atari would no longer announce products before they were ready to be delivered. This would not only give the beleaguered company time to sort out their financial and operational problems, but also would be the first step in making the company appear as a reliable and credible entertainment electronics company.

During these intervening months, we have all watched Morgan's efforts to reduce overhead by manufacturing products in Taiwan, laying off hundreds of both blue and white collar workers and eliminating unprofitable operations such as APX and Alan Kay's research division. Many of us have wondered whether these were wise moves, playing Monday morning quarterbacks with Atari's future.

At the same time, the XL line of computers, primarily the 800XL, has quietly been selling well and has helped Atari regain a prominent position in the home computer market. In 1983, Atari hardware sales accounted for only four percent of the low end computer market. As of April, 1984, Atari now commands twenty-five percent of that market. The reports of Atari's death were premature.

Aside from the 800XL computers selling better than even Atari's prediction and the availability of the Atari Touch Tablet, there was no news coming out of Sunnyvale. Then, in early May, Atari officially announced the venture with Lucasfilm to produce state-of-the-art entertainment software for their computers and 5200 video game. The two games, **Ballblazer** and **Rescue on Fractalus**, have been well received by the press, but will not be available until July. As the approaching Summer Consumer Electronics Show loomed closer, rumors of 1450XLDs, expansion boxes and high end graphics computers began to circulate.

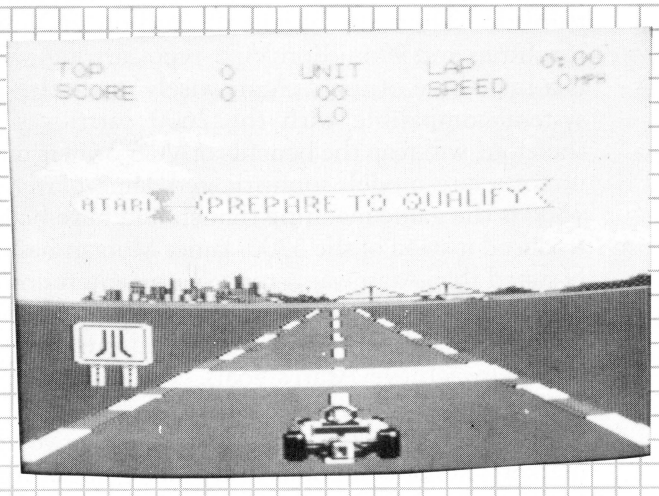
When Atari announced that there would be a press conference on Monday, May 21 in New York City, expectations of both consumers and the industry rose — in anticipation of what fabulous piece of hardware would be announced. The result was the introduction of the $150 Atari 7800 ProSystem Video Game.

The 7800 ProSystem is an advanced video game that boasts having the best color graphics of any computer or video game currently available. This is

made possible by means of a custom designed semiconductor chip that Atari produced in-house. The graphics chip was designed by video game programmers and goes beyond the capabilities of the familiar ANTIC chip found in the computers. Not only does the 7800 offer better color and graphics than other systems, but the number of video objects that can appear on the screen at one time has been increased to 100. Also, the size and the shape of the objects that appear on the screen can be manipulated more, and the color is more saturated.

The 7800 is styled much like the 5200 but smaller. Two totally redesigned joysticks come with the system. The controllers, smaller and narrower than earlier models, have a self-centering stick and fire buttons located on either side, to accommodate both left- *and* right-handed players. These ProLine controllers will also work with other Atari products. In addition to playing advanced video game cartridges made just for it, the 7800 will also play (without an adapter) the nearly 400 titles already designed for the 2600 VCS game. Moreover, there will be a special adapter for the 5200 system that will allow it to play the 7800 and 2600 game cartridges.

Pole Position II on the new 7800 ProSystem, featuring enhanced graphics and added features.



Two other features make the 7800 an interesting piece of hardware. One is the expansion interface which will allow "future video game technologies" to be used with the system. Atari would not be specific as to what "future technologies" really means. However, the other feature is more understandable. By means of an optional full-stroke keyboard, the 7800 may be turned into an "introductory" home computer. A maximum of 20K of memory and full compatibility with all current Atari computer peripherals (via a serial I/O connector) rounds out the system. However, existing computer software will not run on the 7800. The keyboard is expected to retail for less than $100, and it — together with software — is to become available during the fourth quarter of 1984.

There will be thirteen games for the 7800 when it becomes available in July. These games will retail for about $30 and will fall into three categories. In the "exciting originals" category are the two Lucasfilm games mentioned previously and **Desert Falcon** (a diagonal-scrolling shoot-'em-up). The "exclusive arcade hits" group consists of **Pole Position II**, **Food Fight**, **Galaga**, **Xevious** and **Ms. Pac-Man**. Finally, the "arcade classics with enhanced graphics" titles include **Robotron 2084**, **Dig Dug**, **Joust**, **Centipede** and **3-D Asteroids**. Initially, a **Pole Position II** cartridge will be packed with every system, but, after September, the game will be built into the 7800. There will also be a high-score cartridge that will provide players with the ability to record, update and review the top six scores in up to 65 ProSystem games.

All of the games except the Lucasfilm titles were shown at the press conference, and most lived up to the boast of having the best graphics of any current computer or video game on the market. Five minutes or less is usually not enough time to judge the quality and playability of a video game, but, in this brief time, **Desert Falcon**, **Pole Position II**, **Robotron 2084** and **Centipede** all showed themselves to be excellent games, both in terms of graphics and playability.

Technically, the 7800 ProSystem appears to be a quality state-of-the-art video game machine. But there are some tough questions that need to be asked, and finding the answers may help in understanding Atari's future direction, and their success.

Is a new video game machine what consumers want right now? Atari thinks so. They believe that the video game business is very much alive and is just like any other consumer entertainment business, such as the record or movie industry. Business cycles and creativity fluctuate in a cyclical fashion. The introduction of the Atari 7800 is not just a marketing whim but, rather, is part of a "well-planned strategy" of a series of new products that extends through the end of 1985. Atari cites that, during the first four months of 1984, 20 million game cartridges were sold — and over half were purchased at full retail.

Atari commissioned a market research study to find out what consumers want and what they would pay for in a video game system. They found that game-playing consumers want outstanding software, meaning a wide variety of game cartridges and arcade-quality graphics. Consumers also want to have the

(continued on next page)

capability to expand to future "game technologies" as they become available. Of the people who were shown the 7800 system, approximately forty percent said they would buy it. In addition, Atari expects that about half of the 7800 purchasers will be 2600 owners trading up.

Necessity's child.

Does Atari need the 7800 right now? Yes. Atari, by their own account, says they now have about seventy-five percent of the video game market. . .and they realize that their share would slip if they were to sit back and do nothing. The 5200 is no longer in production, and the VCS is old technology. Therefore, Atari needs a new product to remain in the video game business — and they are betting heavily on the 7800.

Will the Atari 7800 ProSystem be successful? I think so. There are almost 15 million 2600 game machines and 90 million VCS-type cartridges. That is a huge base of users. Atari wisely made the 7800 system compatible with the 2600 cartridges and, therefore, will reap the benefits of VCS owners trading up for a late-model, sophisticated game-player. The 7800 is the game machine that should have been introduced instead of the 5200. James Morgan has clearly stated that Atari wants to be in the entertainment, education and leisure-time activity business, and he believes that maximizing profits and minizing risks will help achieve Atari's goals.

Will the 7800 system compete with the XL line of computers? Atari believes that there are two viable markets: home computers and video games. Supplying both hardware and software to these markets is what Atari wants to do — and will do, according to Morgan. It is true that the 600XL computer is not selling very well. Given an almost identical price, it would seem that there would be competition between the 7800s and the XLs. But Atari maintains that there are two distinct markets, and that one does not influence the other. Regardless of what Morgan says, it would not be surprising to find the 600XL computer discontinued by the end of the year, and the 7800/keyboard computer becoming Atari's entry at that level. So, in a way, the 7800 *may* drive the 600XL off the market.

Marketing the 7800.

The "introductory computer," as Atari calls it, does not seem to be a strong aspect of the 7800 system. As Morgan stated, "the keyboard is not a major part of the Atari line. It is there for those people who want it. But it is important to make sure the consumer understands that, with the addition of the keyboard, they are not getting a full-powered computer." Atari and others have announced keyboard add-ons before, and few have been able to deliver. Even if Atari can deliver the keyboard at $100, with the $150 for the 7800 itself, the amount spent is close enough to warrant the buyer getting an 800XL. If there really are two separate markets, then the keyboard computer may be successful. Most of the industry, though, feels that there is only one computer/video game marketplace, and, if that holds true, Atari's 7800 will not succeed.

Deliverability?

A final concern relates to Atari's stated intention not to announce products unless they can be delivered. The 7800 will not ship until July, meaning that it will be August before we see it in the stores. The keyboard and 5200 adapter will not be available until the fourth quarter. We are talking about a range of two to six months for product availability. That hardly seems to fit in with the stated policy and will not improve the consumer's perception of Atari's integrity.

And so. . .

To summarize, I see the announcement of the 7800 ProSystem as a positive step for Atari. If it can help to regain the video game market share that Atari has lost over the last couple of years, then Atari will be better off. If Atari is financially healthier, they can put more thought into the design of their computer products — which will mean new and better equipment for the Atari user. □

Bulletin Board Update

Here is a brand new BBS that didn't make it into our listing in the telecommunications issue (**ANALOG Computing** no. 19). So pick up your phone, lock down your modem and start dialing!

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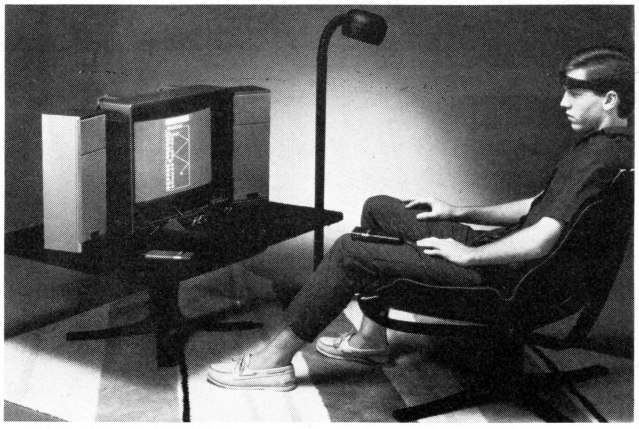
CIRCLE #109 ON READER SERVICE CARD

NEW PRODUCTS

by Lee Pappas

CHICAGO, IL — "June 3, 1984 — The day the future began" was Atari's buzzword at an exclusive press conference held on that date in the Westin Hotel. Hosted by Bruce Entin, Atari PR, the press was pummeled with Atari-facts as to why the company was on the turn-around. Foremost is their new **7800 ProSystem** (see our review, page 8).

The latest computer (originally to be called the 1450XLD, but as of this writing not officially christened) sports a built-in 352K disk drive with a data transfer nearly five times that of the 810. The new machine also includes an internal modem and speech synthesizer, and bundled with it comes yet-undetermined software. The "**Atari grapevine**" will be an in-house database and Q&A service for those purchasing the new machine.



MindLink System, state of the art for the state of your mind. A revolutionary new product that, together with special software, allows you to manipulate video objects on your Atari 2600 Video Computer System or XL series home computer — without the use of conventional hand controllers.

The new expansion box hooks up to the no-name machine or to the 600XL or 800XL, giving them 80 columns, a real-time clock and 128K of RAM, along with future upgrades, perhaps to run MS-DOS or CPM. The Atari **MindLink** picks up impulses from your forehead (you wear it like a high-tech headband), giving you limited hands-off control of on-screen objects or functions: i.e., playing **Breakout** without any hand controls. The **Milestone** series includes a letter and word tutor, as well as various other programs supporting the touch tablet and lightpen. Also included in the **Milestone**s will be home health programs, such as a tutorial on CPR. This series is touted as "one of a kind in excellence and quality. . .to bring back the magic." Second in the AtariLab is the **LightLab**, containing over 100 experiments.

Learn science by doing it with AtariLab. AtariLab *LightLab* shown here comes complete with 16K plug-in program cartridge, light sensor, calibrated light source, light stand, "Magic Litestick" and experimenter's guide. For children ages 4-12.

The **Futuremaker** series is an effort by Atari to show how computers can be used to "enhance education." **This Is Ground Control** and **Through the Star Bridge** are two first steps in this direction, both teaching astronomy and physics.

The recently-released **Syn-Series** developed by Synapse Software for Atari includes **SynCalc**, **SynTrend** and **SynFile+** — all outstanding programs integrated with **AtariWriter**. Yaacov Agam, the founder of kinetic art, has developed a program to assist in the interaction of creative technology and art using the computer.

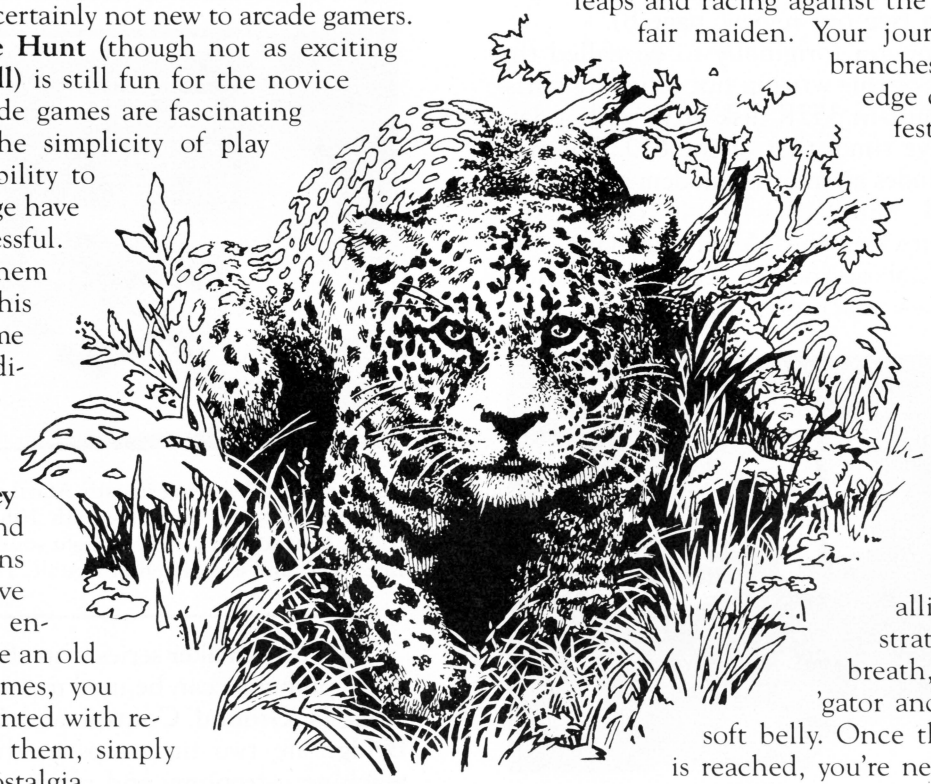
The Lucasfilm games, **Rescue on Fractalus** and **Ballblazer**, promise new fun on the computer with super-enhanced graphics. All of this seems to point to the fact that Atari does indeed continue their interest in the home computer line, with some new fuel added to the fire. And lastly, Alan Alda will continue as Atari's spokesperson, with some dynamite new TV commercials promoting the Atari computer line as the best (but we've known that all along). □

JUNGLE HUNT
ATARI, INC.
P.O. Box 427
Sunnyvale, CA 94086
16K Cartridge $44.95

by Ray Berube

Have you ever harbored a secret desire to be Tarzan — to swing through the treetops, wrestle alligators, battle cannibals and rescue a damsel from a boiling supper pot? Well, Atari has finally put their arcade game **Jungle Hunt** on a cartridge. Now you can brave the dangers of a tropical rain forest in the comfort of your rec room.

Jungle Hunt is just another version of Activision's **Pitfall**, and that's certainly not new to arcade gamers. Regardless, **Jungle Hunt** (though not as exciting or varied as **Pitfall**) is still fun for the novice player. Some arcade games are fascinating and addictive. The simplicity of play plus the game's ability to sustain its challenge have made them successful. It's what makes them so enduring in this world of instant fame followed by immediate oblivion. **Pac-Man**, **Star Raiders**, **Missile Command**, **Donkey Kong**, **Tempest** and the various editions of **Jungle Hunt** have the fascination to endure. Even if you're an old hand at these games, you won't be disappointed with repeated playing of them, simply for the sake of nostalgia.



For the uninitiated in arcade gaming, **Jungle Hunt** is a fine game through which to discover the thrills of video fun. **Jungle Hunt** has three levels of play: beginner, regular and advanced. It also has an option for two players, so you can share the fun. Its beginner level allows the newest of gamers the opportunity to develop playing skills. This level permits more "deaths" and a slightly slower pace, but the challenges are still tough enough for the novice. Once you're adept at the beginner's game, you can improve your score and timing before graduating to the next skill level. If you're new to this kind of fun, become a master of the beginner's level before moving on. (Warning: this kind of play can become addictive! My wife nearly forgot she was married when she started to get the hang of playing **Jungle Hunt**.) You'll really enjoy it and find yourself truly ready for the next level.

The thrill of victory.

Just what are **Jungle Hunt**'s challenges? The dangers of the jungle are presented in a pleasant, horizontally-scrolling display. As an intrepid explorer, you must first swing through the treetops on vines, timing your leaps and racing against the clock to rescue a fair maiden. Your journey through the branches brings you to the edge of an alligator-infested river. Holding your breath, you dive deep into the raging current and swim for the opposite shore. While you swim, you encounter hungry 'gators and most murky muck. You have to keep surfacing for air and stabbing at attacking alligators. The best strategy is to take a breath, dive under the 'gator and stab up into his soft belly. Once the opposite shore is reached, you're nearly home free.

Climbing out of the river, you jog up a hill while avoiding falling boulders of various sizes. Once past this obstacle, you will have to negotiate your way around hostile cannibals and time your leap onto the rope, now lowering your maiden into the boiling supper pot. If you leap too soon, you join her as an ingredient in the stew.

Civilized considerations.

The price for this game is a little steep! Yet it seems that every arcade game that finds its way to the home is overpriced. Truly advanced arcade gamers will find **Jungle Hunt** fairly tame. If you're a master at the joystick, then this game probably isn't for you. If you're a newcomer or a parent buying a birthday surprise, and your neighborhood toy store has **Jungle Hunt** on sale, then you will probably get your money's worth. □

Proset

16K Cassette or Disk

by Richard J. Browne

Trying to remember Printer Control Codes lead me toward the creation of this program for the NEC 8023, Prowriter 8510 and PMC DMP-85 printers (which are essentially the same machine). This listing, when run on an Atari 400, 600XL, 800 or 800XL, will program any of these printers for various font choices, margins, tabs and spacing. . .eliminating the need to search for the correct coding.

The final push I needed to make up **Proset** came when I had to set "form length" to lengths other than 66 or 72. As the three printer owner's manuals do not provide a form length setting program compatible with the Atari, I made several calls to Leading Edge, NEC and numerous computer stores, and visited two Atari computer clubs — all to no avail. Two weeks after my first call, I received a partial program from a technician at NEC. From that listing, Lines 850 through 930 emerged.

Program overview.

Lines 40 - 260 form the first menu, which gives the user font characteristic choices, sets them and accesses the second menu. Lines 330 - 780, the second menu, define options and set form and line-spacing characteristics. Lines 270 - 300 and 790 - 820 give the user the option of combining menu choices. Lines 840 - 930 set form length, while Lines 960 and 970 reset the printer to its default settings.

After selecting the perforation skip-over, the printer will list 60 lines on a page, skip over the fanfold paper perforation and continue printing. A form length of X can be set by changing the 60 in Line 860 to X and the 62 in Line 890 to X+2.

When setting margins and tab stops, one should first set up the font size, since the settings will not change to coincide with font size changes. Note how many characters will be permitted on a printed line — and do *not* exceed these numbers when setting either the margin or tabs. When entering these numbers, remember that they *must* be three digits long and (in the case of tabs) the numbers *must* be separated by commas.

All settings will remain enabled until the printer is turned off, this program is rerun, the program's reset option is selected by the user, or changes are received from the Atari. □

BASIC Listing.

```
0 REM
1 REM  PRINTER CONTROL, SET-UP FOR:
2 REM            NEC 8023
3 REM          PMC DMP-85
4 REM        PROWRITER 8510
5 REM
6 REM          program by
7 REM
8 REM     RICHARD BROWNE  MAR 84
9 REM
10 DIM A$(1),C$(8),M$(3),P$(2),T$(130)
20 C$=CHR$(27)
30 GOSUB 960
40 POKE 82,0:? "{CLEAR}":?
50 ? "▶1. PICA  NORMAL-(10cpi)"
60 ? "▶2. ELITE▶(12cpi)"
70 ? "▶3. CONDENSED▶(17cpi)"
80 ? "▶4. PROPORTIONAL SPACING"
90 ? "▶5. DOUBLE WIDTH CHARACTERS"
100 ? "▶6. BOLD PRINT"
110 ? "▶7. UNDERLINED PRINT"
120 ? "▶8. DEFINE LINE SPACING"
130 ? "▶9. RESET PRINTER'S DEFAULTS"
140 ? :? "▶▶0. TO END"
150 ? :TRAP 40:? "▶WHAT'S YOUR CHOICE.
.";:INPUT F
160 IF F=1 THEN LPRINT C$;CHR$(78):GOT
O 270
170 IF F=2 THEN LPRINT C$;CHR$(69):GOT
O 270
180 IF F=3 THEN LPRINT C$;CHR$(81):GOT
O 270
190 IF F=4 THEN LPRINT C$;CHR$(80):GOT
O 270
```

```
200 IF F=5 THEN LPRINT CHR$(14):GOTO 2
70
210 IF F=6 THEN LPRINT C$;CHR$(33):GOT
O 270
220 IF F=7 THEN LPRINT C$;CHR$(88):GOT
O 270
230 IF F=8 THEN 320
240 IF F=9 THEN GOSUB 960
250 IF F=0 THEN 940
260 GOTO 40
270 ? :? "  DO YOU WANT TO COMBINE? (Y
es/No)";
280 INPUT A$
290 IF A$="Y" THEN 150
300 IF A$="N" THEN 940
310 GOTO 270
320 ? "K";? :?
330 ? "}1. LEFT MARGIN SET"
340 ? "}2. HORIZONTAL TAB SET"
350 ? "}3. UNIDIRECTIONAL PRINTING"
360 ? "}4. REVERSE LINE FEED"
370 ? "}5. LINE FEED PITCH"
380 ? "}6. PERFORATION SKIP OVER"
390 ? "}7. DEFINE PRINT TYPE"
400 ? "}8. RESET PRINTER'S DEFAULTS"
410 ? :? "}}0. TO END"
420 ? :TRAP 320:? "}WHAT'S YOUR CHOICE
..";:INPUT S
430 IF S=1 THEN 530
440 IF S=2 THEN 610
450 IF S=3 THEN LPRINT C$;CHR$(62):GOT
O 790
460 IF S=4 THEN LPRINT C$;CHR$(114):GO
TO 790
470 IF S=5 THEN 700
480 IF S=6 THEN 840
490 IF S=7 THEN 40
500 IF S=8 THEN GOSUB 960
510 IF S=0 THEN 940
520 GOTO 320
530 ? "K";? :?
540 ? "}  SET LEFT MARGIN TO: XXX"
550 ? :? :? "}    XXX MUST = 000 TO 160
"
560 ? :? "  DEPENDING ON CHARACTER PIT
CH SETTING"
570 ? :? :? "}  SET LEFT MARGIN TO: ";
:INPUT M$
580 IF M$<"000" OR M$>"160" THEN M$="0
00":GOTO 570
590 LPRINT C$;CHR$(76);M$
600 GOTO 790
610 ? "K";? :?
620 ? " HORIZONTAL TABS XXX,XXY,XXZ (U
P TO 32)"
630 ? :? :? "      TAB STOPS MUST BE 0
00 TO 160"
640 ? :? "  DEPENDING ON CHARACTER PIT
CH SETTING"
650 ? :? "  caution: no error trap in
this option"
660 ? :? :? " SET TABS TO :";:INPUT T$
670 LPRINT C$;CHR$(40);T$;CHR$(46)
680 ? :? " HORIZONTAL TABS SET AT:";:P
RINT T$
690 GOTO 790
700 ? "K";? :?
710 ? "}LINE FEED PITCH SETTING XX"
720 ? :? "}    XX MUST = 01 TO 99"
730 ? :? "}      18 = 1/8 INCH"
740 ? "}  24 = 1/6 INCH (NORMAL)"
750 ? :? :? "}SET LINE FEED PITCH TO:
";:INPUT P$
760 IF P$="00" THEN 700
770 LPRINT C$;CHR$(84);P$
780 ? :? "  LINE FEED PITCH SET AT: ";
:PRINT P$;:PRINT "/144 INCH"
790 ? :? "  DO YOU WANT TO COMBINE? (Y
es / No)";
800 INPUT A$
810 IF A$="Y" THEN 320
820 IF A$="N" THEN 0
830 GOTO 790
840 OPEN #2,8,0,"P:"
850 PUT #2,29:PUT #2,65:PUT #2,64
860 FOR X=2 TO 60
870 PUT #2,64:PUT #2,64:NEXT X
880 PUT #2,67:PUT #2,64
890 FOR X=62 TO 66
900 PUT #2,64:PUT #2,64:NEXT X
910 PUT #2,65:PUT #2,64
920 PUT #2,30
930 CLOSE #2:LPRINT :GOTO 790
940 ? :? "}PROGRAMING IS NOW COMPLETE.
"
950 FOR X=1 TO 400:NEXT X:PRINT "K":EN
D
960 LPRINT C$;CHR$(78);C$;CHR$(79);C$;
CHR$(89);C$;CHR$(34);C$;"L000"
970 LPRINT CHR$(15);C$;CHR$(48);C$;CHR
$(102);C$;CHR$(65);C$;CHR$(60):RETURN
```

CHECKSUM DATA

(see page 27)

```
0 DATA 585,796,966,244,596,595,132,599
,142,603,175,641,774,783,341,7972
60 DATA 413,274,546,694,169,63,330,72,
176,783,556,559,562,566,210,5973
210 DATA 536,561,538,408,548,506,910,7
81,782,769,713,46,661,187,840,8786
360 DATA 884,689,662,11,68,173,695,574
,580,610,406,597,609,347,439,7344
510 DATA 581,707,53,801,721,646,57,635
,403,732,49,292,437,642,472,7228
660 DATA 681,433,28,759,48,807,369,585
,133,582,670,405,238,106,769,6613
810 DATA 773,300,745,300,30,171,810,80
3,351,791,780,844,743,440,503,8384
960 DATA 933,183,1116
```

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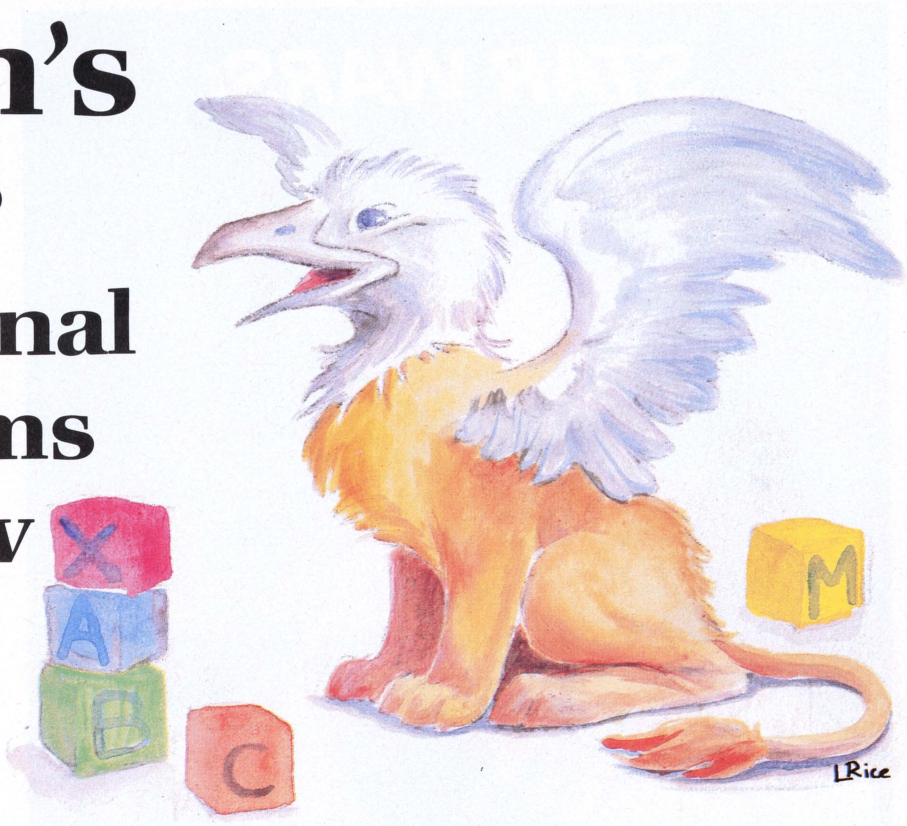
Griffin's Lair
Educational Programs Review



by Braden E. Griffin, M.D.

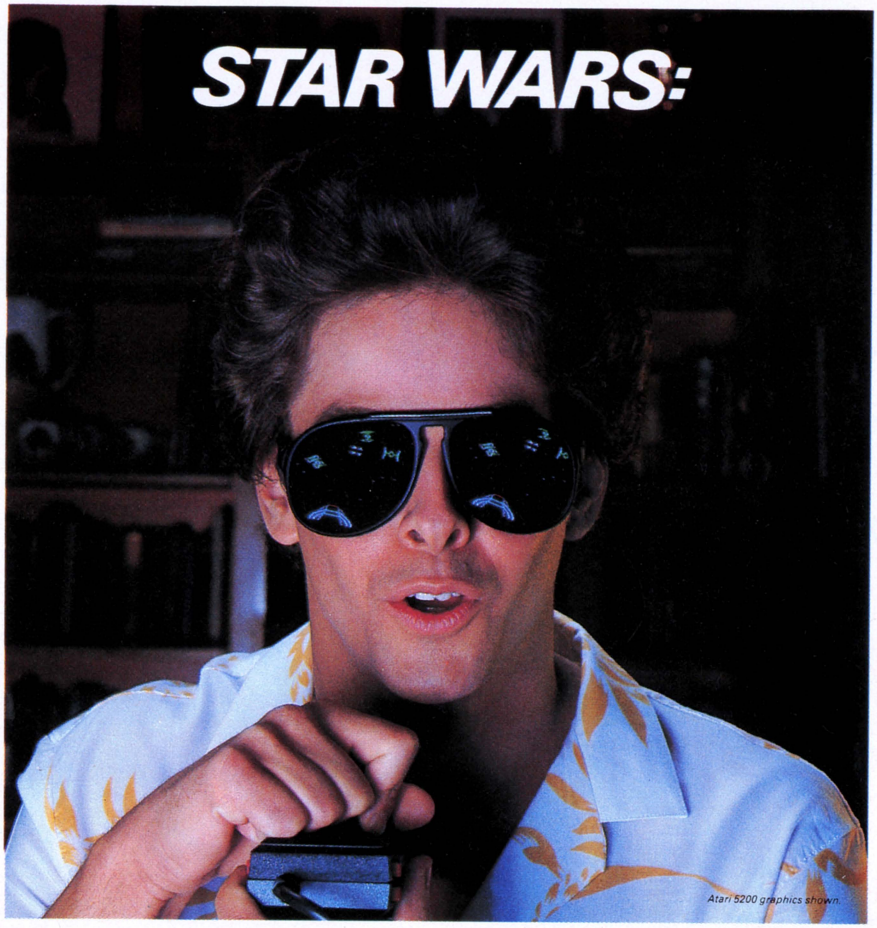
So, you want Jane and Johnny to learn about life, do you? This month's **Griffin's Lair** reviews games that teach, among other things, safety and problem-solving, spatial relationships, alphabetizing and dictionary use. The reinforcement of positive habits is another promising use for educational programs. . .as long as they're not created by Orwellian hackers.

WORD FLYER
by Childware
ELECTRONIC ARTS
2755 Campus Drive
San Mateo, CA 94403
48K Disk $35.00

When I receive a new product to review, I throw it in the disk drive and begin to play it, paying little attention to the accompanying documentation. This is contrary to my natural tendency toward a compulsive behavior pattern which often forces me to practically memorize the instructions before beginning anything. (You can imagine my exasperation on Christmas Eve, attempting to assemble a hobby horse made in Korea, with instructions prepared in Albania. I never did find slot B!) I have developed this aforementioned impulsive approach simply because almost everyone I know does it that way. During this initial evaluation, I frequently forget what company has produced a particular program. In a way, this may help eliminate some of my biases. However, the unique packaging of Electronic Arts' products and the uniform excellence of everything I have seen come from them, makes it impossible not to be prejudiced. The aura of high quality items associated with certain brand names is slowly fading from our society, and the old motto "a name you can depend on" is often just an advertising gimmick. Well, **Word Flyer** by Childware maintains the image of Electronic Arts as the "primo" software producer.

Word Flyer is a word matching game for all ages. The playing screen presents two large birds, each sitting atop a word tower. Using the joystick, one of the four words or letters in the word tower is selected to be the "flyer" and flies to the middle of the screen. Soon, zooming words appear, moving towards the center of the screen from the background. The object is to match the flyer by moving it until it touches the appropriate zooming word. As the number of correct matches increases, a score bar is filled with color. When it is totally filled, one moves on to the next level. There are five levels in all, beginning with one- or two-letter flyers and progressing to three- and, finally, four-letter words. As the levels advance, there are hazards to make

(continued on next page)



vocabulary of over 2000 words makes play quite interesting. It is suggested that a dictionary be used to determine if unknown letter combinations are actual words and, if so, what they mean. Development of such reference skills is essential. Hopefully, the importance of using a dictionary will be instilled, and parents will not have to continue droning, "go look it up." Parents are encouraged to play along with their children, since — in the two-player mode — the two scores add together. I was impressed with the section in the manual devoted to parents — how they might help their children. The first suggestion is that parents not stop reading to their children when they start reading themselves. Considering all the ways available to assist in a child's education, computer programs or otherwise, reading aloud may very well be one of the most productive.

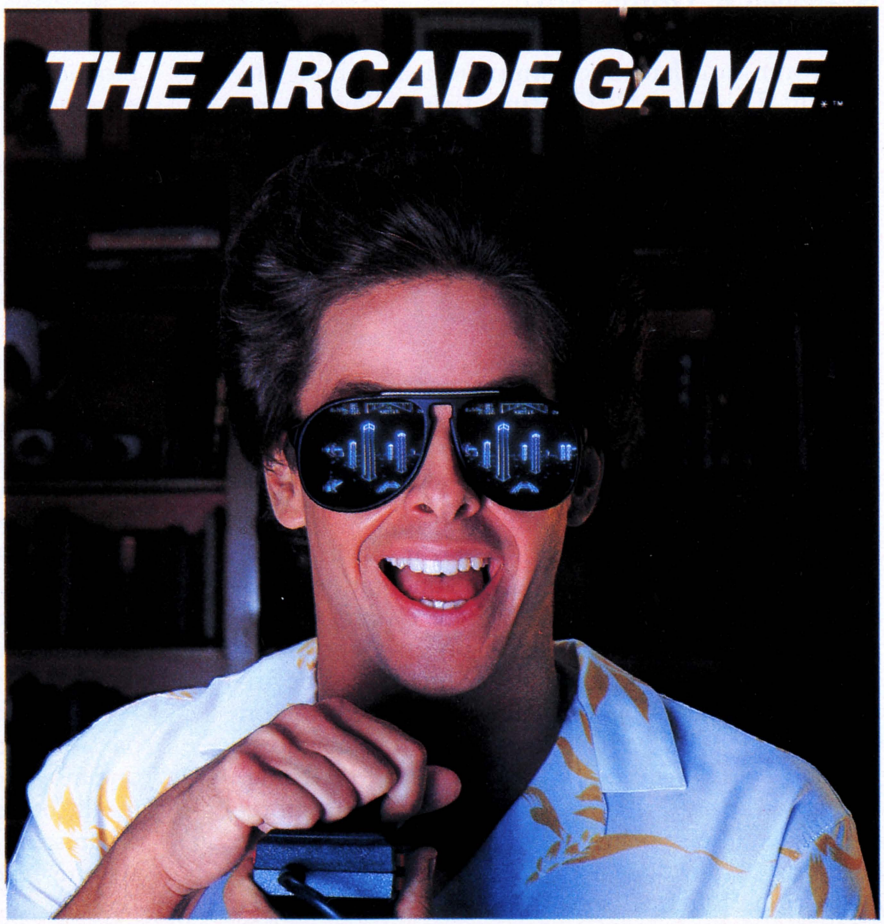
(continued on next page)

(continued from previous page)

the matching process more difficult. These include nonsense words that lower one's score if matched and a careless cloud that obscures some of the zooming words. In the fifth and final level, the flying time is shortened, and the zooming words fly much faster.

A number of options are available, including the ability to change flight levels and flight speed. The alphabet bar may be used to change the letters that the words begin with. In addition, the game may be selected for one or two players. An hourglass acts as the timer in the two-player mode.

The game itself is easy to play, and even children not yet able to read can enjoy it as much as others. Pattern recognition and hand/eye coordination are enhanced in very young children playing the lower levels. Alphabetizing and spelling skills are taught as the levels progress. A



Word Flyer is fun, educational and augmented with excellent sound and graphic effects. Children of all ages will thoroughly enjoy the experience. Electronic Arts is "a name you can depend on."

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It is always nice to see new and innovative ideas in computer education, particularly when they are directed at the very young. Few programs on the market are able to hold the attention of this normally hyperactive group. With these two separate programs, **Storyline** and **Safetyline**, Maximus succeeds where others fail by presenting an interactive movie sure to brighten the eyes of preschool and early elementary aged children. Both programs follow a similar format, with two software movies on each cassette. Games designed to reinforce the movies' messages are found on an accompanying cassette or disk. The instructions are thorough, and, with a little help initially, most children will be running the programs without assistance.

Safetyline.

This is a great program. The movies, *Sam Goes to School* and *Sam Gets Lost at the Zoo*, are narrated by Max the Cat, Sam's invisible friend. The first movie presents important safety tips for children, as Sam learns to cross a busy street at the traffic light and arrive at school safely.

The two accompanying games are fun and masterfully complement the movie. In *Streetcross*, one must get Sam to school quickly and safely. All the safety tips learned from the movie must be observed. If Sam tries to cross in the middle of the street or against the light, warning music plays, and Sam is moved back to a safer place. The *Hidden Tips* game is a word search game similar to those found in the newspaper's comic section. One of Max's safety tips appears at the bottom of the screen, and a key word from it appears at the top. The goal is to find the key word hidden in a matrix of random letters.

At the Zoo.

In this movie, the plight of a lost child is addressed. Five important safety tips are emphasized. These include: 1. stay calm; 2. try to find a policeman and tell him your name, address and telephone number; 3. seek out someone you know well and trust; 4. find a store with lots of customers and ask the clerk for help, loudly, clearly and politely; and 5. never talk to strangers. The game, *Tipmatch*, is a Concentration-like matching game encompassing safety tips learned from the movie. In *Zoomaze*, Sam is lost and must wend his way through a maze to one of four boxes. If he finds the policeman, Sam will be shown where the teacher is, and, once she is reached, a musical salute is played. But Sam must be careful, for if the stranger's box is reached, the game is lost.

Both sides of **Safetyline** present extremely important lessons for the young child. And somehow, no matter how often we admonish our children about safety, it frequently gets mixed in with messages like "eat your vegetables" or "don't sing at the supper table." The graphic depiction of these same safety tips, with the positive reinforcement of the games, may provide a more lasting impression. Reading, memory/retention and basic problem-solving skills are part of the educational experience. This program offers, not only a good way to introduce kids to the computer, but a chance to develop necessary early survival skills.

(continued on next page)

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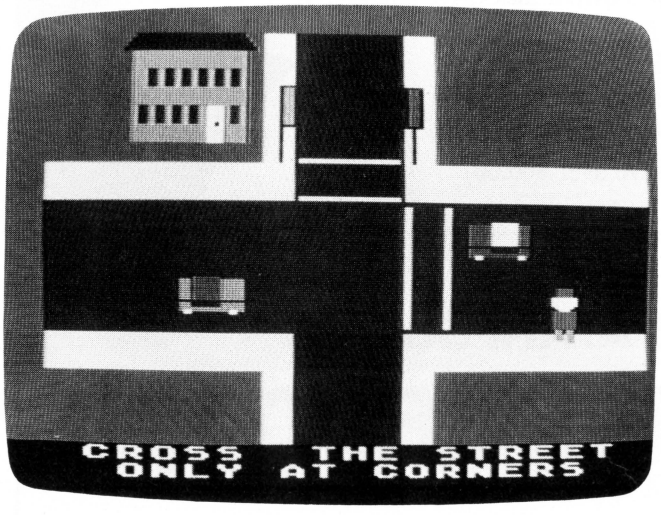
CIRCLE #119 ON READER SERVICE CARD.

Word Flyer.

Storyline.

Clover the Clown provides the narration for two familiar fables, "Rumpelstiltskin" and "The Ugly Duckling." These two are cleverly presented in software movies, each of which lasts about ten minutes.

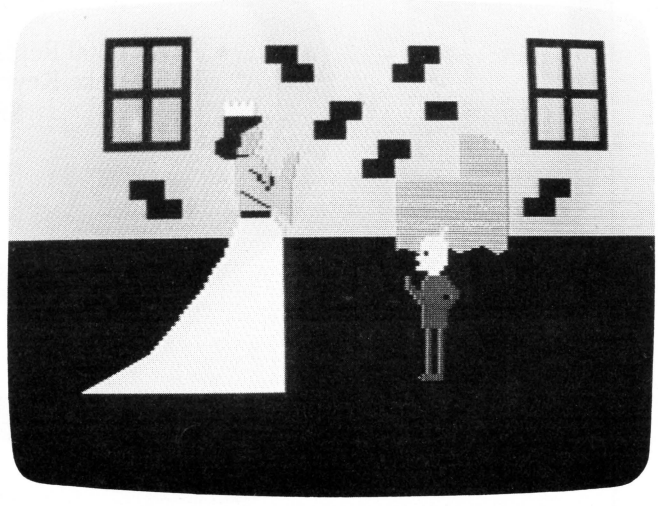
On the "Rumpelstiltskin" side, the interactive games are *Guess My Name* and *Promises, Promises*. The former is a hangman-type game, where the object is to guess the letters of one of over two hundred boys' or girls' names given to the troll. A wrong guess results in part of the troll's face appearing. Correct responses build up one's stack of gold. If the name has not been spelled by a certain number of turns, and the troll's face is completed, he then growls and steals some of the gold. In *Promises, Promises*, the goal is to promise Rumpelstiltskin less gold than he wants. A number between 10 and 90 is selected on a bar, then Rumpelstiltskin moves his arrow randomly along the bar, stopping on the amount he wants. If a lesser amount is selected by the player, then that amount is added to the stack of gold. After ten tries, if the troll has the most gold, he will jump with glee. On the other hand, if he loses, he will explode and become a pile of straw.



Safetyline.

Swan Song.

The movie sequence on this side is so well narrated that tears welled up in my eyes. (Granted, I was once accused of crying at an ROTC training film.) In spite of having to reach a bit to present two relevant interactive games, the two associated with "The Ugly Duckling" are fun and educational. *Pick the Twins* involves matching the two identical pictures from a group of eight displayed. In some, the differences are quite subtle. There are five different sets of either ducks or flowers in each round. In *Duck Puzzle*, twelve squares of a picture puzzle are scrambled, and the player must restore the original in the fewest number of moves. The hard version of this game makes the process more difficult, as the puzzle rescrambles itself during play.



Storyline.

Storyline teaches spatial relationships and pattern identification, as well as the skills involved in hangman. Clover the Clown's advice in "Rumpelstiltskin" — "Never make a boast that is untrue" and "Don't make promises you can't keep" — comes across loud and clear. Young children see themselves differently than we see them, and the message found in "The Ugly Duckling" is a valuable one.

Committed to providing "software designs for developing young minds," Maximus has succeeded admirably. I enthusiastically recommend both of these programs. □

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Selecting your Perfect Printer

by Steve Panak

If you've had your computer for a while, maybe you feel that it's about time that you had something tangible to show your friends and relatives — to prove that your computer is more than a glorified video game. If so, then give your Atari system the power of creation with a new printer. Once you are able to produce hard copy, you will be better able to edit your programs, as well as being able to print out files and use word processing programs to pound out text, rebuffing those of little faith who are either too poor or too stupid to have their own system. But, if you've tested the waters in search of your perfect printer, you may have found yourself drowning in an ocean of different types, brands and features. Well, take heart; after reading this article, you should be able to both pull your head above the water *and* fish out the printer that will not only work for you, but one which you will later consider a wise investment.

There are two steps to follow when selecting a printer: (1) determine your needs and budget; (2) fit a printer to those needs and budget.

Your first step is the most important one, because a definite objective always improves your final decision. Ask yourself what you will use the printer for. Will it be primarily to print out program listings? Will you also want to do some word processing, and — if you do — will the output be used for informal correspondence or for school or business use? Finally, how much do you expect to use it? Truthful answers to these questions will supply you with an objective that ensures your getting (and paying for) only the options you want and need.

Establish your budget constraints and confine yourself to a price range. Printers range in price from lows of around $100 to highs of well into the thousands of dollars, so finding a printer to fit your budget should not be a problem.

The three basic types.

Once you've answered the above questions, you are ready for the more difficult task of fitting a printer to your needs. Printers come in three basic types, classified by their mode of operation: thermal, dot-matrix and letter-quality. Each of these types forms the images on the paper in different ways, which give rise to advantages and disadvantages.

Printers which utilize the thermal method have a print head with a number of small electrodes which burn tiny dots onto special paper as the head moves across it. These dots form the letters and graphics. Advantages are inexpensiveness, durability and near-silent operation. Also, you will never run out of ink. However, they require a special type of paper, which is more expensive than regular typing paper and may be hard to find in different forms. So printing on labels, envelopes, index cards and the like may be impossible.

Thermal printers would be best for the person who wants his printer to primarily produce program listings. It would also allow for word processing, but the paper has a peculiar slippery feel and often darkens with age. If only program listings will be printed, the best choice would be a thermal printer which prints on narrow rolls of paper, as these are the least expensive printers available.

Dot-matrix printers are similar to thermal printers, in that they also print images using tiny dots. However, the dot-matrix printer's print head has a number of little rods or needles which strike an ink ribbon against the paper to form the image. They are noisier than thermal printers, and the head has a limited lifetime, which — after extended use — will have to be replaced, as will the ink ribbon. While a new ribbon will cost about $10, a replacement head will range from $40 to over $100, so estimating your total expected use is crucial. An advantage of dot-matrix printers is that they will print on any type of paper that can be fed through the machine.

Because of the similarity of the print heads in thermal and dot-matrix printers, they can print roughly the same things. Both create graphics and characters, and both can feature various type styles, such as elongated, emphasized, compressed, etc. (see Figure 1). Both have similar print speeds and may allow lines to be printed twice, with a slight offset overlap, to nearly equal the quality of the characters of a typewriter or letter-quality printer. The quality of the print and graphics of these printers depends on the number of dots making up the image; the more dots, the better the image.

Letter quality printers are different from both the thermal and dot-matrix in that they have an element, much like a typewriter, which strikes a ribbon against the paper. The element is usually a daisy-wheel (although the Atari 1027 uses print drums to achieve the same result). These printers are noisier (again, similar to a typewriter) and are generally the most expensive (although the 1027 is, once more, the exception at a very reasonable list price of $349). They also print much more slowly than either of the other types, and have ink ribbons which must be replaced occasionally. Their major drawback is that they can only print what is on the element (usually letters) and are thus incapable of printing graphics. However, some printers allow optional interchangeable elements. These additional elements cost around $8 to $10 each and include pica, elite, gothic, script and many other special type styles.

Letter-quality printers are your best bet if you plan to use the output for business or other formal correspondence. However, for school use, the dot-matrix may be adequate — depending on how particular the person receiving the printout is.

There are printers which are used to create color graphics, using small pens to plot lines which form the images. An example of this type is the Atari 1020. These are generally only for graphics and special printing uses. Also available are printers which use laser beams or ink jets to form the images, but these generally cost well into the thousands of dollars and, because of their prohibitive cost, will not be fully explored here.

Finally, there are printers which have their own keyboards and double as electric typewriters. If you consider purchasing one of these printers, remember that, while they may cost less than both a printer and a typewriter, they are considerably more expensive than a printer and a word processing program. The simple fact — the more complex the machine, the more likely it is to fail — applies here.

Other considerations.

In addition to the above factors, there are a few more which apply, regardless of the type of printer under consideration. One of these is the method of paper feed. Some printers use sprockets to pull the paper through the printer, while others use friction feed (much like a typewriter), and some combine both methods. The advantage of friction feed is that anything that can fit into the machine can be printed on, while sprocket-fed printers must use paper with holes along the edges which engage their sprockets. However, the sprocket-fed printer will print on continuous fanfold paper and keep it precisely in line with the print head. Look for a sharp edge to rip paper off as it is removed from the printer.

Your new printer will have to be connected to your system with a cable and an interface. Since nearly all Atari-compatible printers utilize a parallel interface, we will consider only this type. While the Atari and Axiom printers come complete with cable and interface, most printers require you to purchase these separately — at a cost of $50-100. This cost may or may not be included in the price of the printer, so ask to be sure. Also, refer to **ANALOG** issue 16 for a feature describing how to build an interface for around $20. Consider to what extent the printer will become part of the peripheral daisy chain.

Determine the availability and cost of a printer driver, which will allow your computer to tell the printer what to do. Again, this cost may or may not be included in the price of the printer, depending on the supplier.

If you have a word processing program (or will be purchasing one), consider how well the printer and program will cooperate. AtariWriter will work with most printers compatible with the Atari, and allows use of a printer driver, or allows manual entry of decimal codes directly into the text to tell the printer when to underline, subscript, etc. For a review of the AtariWriter, see **ANALOG** issue 11.

A buffer takes the data your computer sends to the

printer and holds it while it is interpreted and printed. When all the data has been sent to the buffer, the computer is freed up to be used again. Since the buffer is filled up faster than the fastest printer can print, the printer's speed is the limiting factor. The larger the buffer, the more likely you will be able to go back to work while the printer labors mindlessly away. Unfortunately, most printers have a buffer of only 1-3K, roughly equivalent to 1000-3000 characters, or about one double-spaced typewritten page. Therefore, your computer could be tied up for an extended period of time when you are printing out a relatively long document. The solution is a separate buffer which can completely empty the computer's memory... These cost about $300, so estimate the value of your time.

The instruction manual is a very important part of any hardware purchase. Look for completeness and clarity. Tables of the necessary decimal codes are very helpful, and a troubleshooting section will save you much time and exasperation. Also look to the instruction manual before you purchase as the definitive authority on the printer's features and options.

While, internally, most printers' mechanisms are identical, external designs differ greatly. Since the exterior will be staring at you, pick a printer which looks aesthetically pleasing to you. Also note the location of the switches, lights and cable connections in relation to the printer's probably location, considering visibility and ease of access.

Most companies will supply you with information and brochures on their printers. If your dealer does not have this information, many companies require a stamped, self-addressed envelope for their response.

Once you've selected your printer, you will have to decide where you will buy it. While mail-order is generally much cheaper than retail, this is because they do not have the overhead of salespeople — who can help you with any little problems which may arise. Some offset this by giving you a number to call for help, and the Atari toll-free hot line is always available. Regardless of mail-order or retail outlet, determine the supplier's return policy. While warranties from the factory apply, regardless of where you purchase your printer (as long as you remember to mail in the warranty registration card), a dealer may give you additional rights. If you purchase through the mail, be sure that your package is insured against any damage in transit.

Common abbreviations.

CPI — characters per inch; measures width of print.

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CPS — characters per second; measures print speed; larger numbers represent faster speeds.

DPI — dots per inch; measures graphic resolution; the higher the number, the better the image.

LIP — lines per inch; measures height of print.

MCBF — mean (average) characters before failure; measures the life of a component before repair is needed.

Your turn.

Now you should be prepared to venture forth and ferret out the printer you need. Take it slow and avoid the high-pressure salesman and impulse buying, as they are your worst enemies. If you are thorough in your search and follow the guidelines in this article, modified with your own common sense, you will end up treasuring your printer rather than cursing the day you bought it. □

The author wishes to express his gratitude to Perfect Computers of Niles, Ohio for their valuable assistance in the preparation of this article.

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THIS IS SUPERSCRIPT.
THIS IS SUPERSCRIPT,ITALICS.

THIS IS DOUBLEWIDTH.
THIS IS DOUBLEWIDTH,ITALICS.
THIS IS DOUBLEWIDTH,EMPHASIZED.
THIS IS DOUBLEWIDTH,DOUBLESTRIKE.
DOUBLEWIDTH,DOUBLESTRIKE,ITALICS.
DOUBLEWIDTH,EMPHASIZED,DOUBLESTRIKE.

Figure 1.

Spelling Checkers for the Atari

by Arthur Leyenberger

Eight years ago the thought of processing words on a computer at home was far from a reality. Dedicated word processors such as the IBM Magnetic Tape Selectric Typewriter cost in excess of $10,000 and were out of reach not only of home users of early microcomputers but most small businesses, as well. Now there are close to a dozen different word processors for the Atari computer.

Using a word processor is clearly more productive than typing, but there is still the chore of proofreading. Wouldn't it be great if there was some way that your computer could proofread your document? Rejoice — because there are currently three spelling checkers for the Atari computer, covering a wide range of features.

Until a couple of years ago, my definition of a "spelling checker" was Miss Snyder, my seventh grade English teacher. She was superb at checking the spelling on my compositions. I could never get away with anything. Times have changed. In today's computer jargon, a spelling checker is a program that proofreads a text file by comparing the words with a dictionary. All words that do not have a match are flagged as possible spelling errors. The dictionary is a list of words contained in a separate file. Some checking programs have the capability for the user to add further dictionaries that might contain often used — but not standard — words, such as names or technical terms.

Regardless of the spelling program, none can do all that Miss Snyder did. A spelling program cannot check for grammatical errors, such as the difference between words like "their" and "there," "way" and "weigh" or "to," "two" and "too." Also, contractions, plurals, hyphenated words, proper nouns and possessives cannot be checked. As a result, these spelling aids are limited to checking *only* spelling, and require the user to understand rules of grammar (and proofread the document, anyway).

There are currently three spelling checking programs for the Atari computer. **Spell Perfect** by LJK will only check files created by LJK's **Letter Perfect** word processor. **Spell Wizard** by Datasoft will check any text files in standard Atari DOS format. This includes files created by **Text Wizard** (Datasoft) and **AtariWriter** (Atari). **Atspeller** (APX) will also check standard Atari DOS text files. There is also a new version of **Atspeller** that works directly with Atari's **AtariWriter** word processor.

It should be noted that LJK does have an inexpensive utility program that will translate an Atari DOS file into an LJK DOS file, and vice versa. Using this program, you could have **Spell Perfect** proof Atari files and **Atspeller** or **Spell Wizard** proof LJK files. I have used this very simple procedure to convert my LJK files into Atari DOS format files, in order to use **Spell Wizard** for checking.

How do they work?

All three programs work essentially the same way. An initial menu is presented when the program is first run. You typically have the choice of proofreading a document, managing your dictionaries or specifying your system configuration. All three programs also count the number of words in your document — which is a handy feature. Let's take a look at the specific features of each package.

Atspeller.

by Atari Program Exchange (APX)

The **Atspeller** package consists of two disks: a program disk and a dictionary disk containing over 30,000 words. When the program is run, you are first asked if you have a "personal" dictionary file. This file is one that you would create from running **Atspeller** and saving all of the scientific, technical and jargon words to a separate dictionary file.

If you do have a personal dictionary, that is read first. Otherwise, the master dictionary disk is inserted into the drive, and you can choose: output to screen or printer, correction, disk directory/file delete/file rename, search dictionary, return to Atari DOS or sort personal dictionary. Regardless of your choice, the program always asks for confirmation of that choice, a useful feature. Next, you insert your document disk and enter the filename to be checked. After the program reads your document file, you must insert the dictionary disk into your drive. The program will check your text by reading the dictionary file and comparing the words. Each time a word does not have a match in the dictionary, you have the choice of correcting the word, searching the dictionary for correct spelling or accepting the current spelling.

When your entire text has been scanned, you have a new, corrected text file. You can then add the words to your personal dictionary file (or create this file, if you don't yet have one). Of the 30,000 words in the master dictionary, 10,000 have come from the *American Heritage Dictionary Word Frequency Book*. These words have been found to be the most commonly used words in the English language. Before looking up a word in the dictionary file, the program first checks to see if the word falls into one of several "nuisance" categories. These special cases consist of single-letter words and words containing a number. Words in these categories are assumed to be correct.

If words end in the possessive case (with 's), the ending is removed before the word is checked. For this reason, it is not necessary to add possessive words to your personal dictionary file. If not for these special cases, many words would be flagged as incorrect, and the checking time would be longer.

Atspeller for the AtariWriter.

Atspeller for the AtariWriter is similar to **Atspeller**, except that the spelling checking function can be used from within the **AtariWriter** word processor. There is a simple initialization procedure in which the **Atspeller** program becomes the AUTORUN.SYS file, so that it is executed immediately upon turning on the computer. The **Atspeller** program then presents its own menu, which includes the **AtariWriter** menu.

If you use **AtariWriter** and a printer driver, there are instructions in the manual for combining the printer driver and the **Atspeller** into one autorun file. The manuals for both **Atspeller** and **Atspeller for AtariWriter** are brief and written clearly. The major difference is that the **Atspeller** manual is typeset and is, therefore, a little easier to read.

Spell Perfect.

by LJK

The package comes on two double-sided disks. This includes a 40/80-column program disk and a single/double density dictionary disk. The documentation is in the form of a tutorial. Although it is better than previous LJK manuals, it is still rather wordy and difficult to follow at times. One problem is that instructions for both one- and two-drive systems are intermixed throughout the text. A better method would have been to have one section for single-drive systems and another for two-drive systems.

The program is menu-driven and has provisions for backing up both the program disk and the dictionary disk. I appreciate the ability for backup, but the implementation is awkward with a two-drive system. In the case of the program disk, the original is placed in drive one, and the backup is written to drive two. Backing up the dictionary is just the reverse, with the original in drive two and the copy in drive one. A consistent method for making backups would be less confusing.

To use the program, you choose "proof a document" from the main menu and enter the name of your previously saved text file. The text file and dictionary file are then loaded. As it is being scanned, the text is shown at the bottom of the screen, and unmatching words are highlighted in inverse video. With each highlighted word, you have the option to "ignore," "change" or "match." "Ignore" skips the word and goes on to the next one. "Change" allows you to fix the spelling of the word directly. "Match" allows you to search the dictionary for similarly spelled words. Some of the words that the program thinks are similar are actually not very similar, but — if it is in the dictionary — the word will be found. A particularly useful feature is that, if a match is found, you only need to enter its number. This avoids possible keying errors and saves time.

One aspect of the program that I did not like is that words of three letters or less are simply not checked. I can understand that this may have been

done to increase the speed of checking, but — in my case — this makes the program less usable. This is because I am a fast typist who uses only four fingers. I make a lot of letter-reversal mistakes, and this happens most often with short words. Proofreading the document for short words and typographical errors is still a must.

Another problem with the program is that you cannot add the corrected words to a separate dictionary. If you want the "misspelled" words to be included in a dictionary for proofing your next document, you must add them — typing them in by hand, using LJK's word processor, **Letter Perfect**. The only solution to this is to add your entire document file to a dictionary. This is time-consuming and often results in adding more words than you want.

The final irksome part of **Spell Perfect** is that more than one user-generated dictionary cannot reside on the same disk. A separate disk is required for each. Overall, **Spell Perfect** is an easy-to-use, moderately powerful spelling checking program.

Spell Wizard.
by Datasoft

Spell Wizard comes on two disks. One disk contains the program, and the other holds a dictionary of about 33,000 words. After loading the main program, you have the option of proofing a document, printing a dictionary, searching a dictionary or exiting the program. Each of these choices results in additional questions being asked of you. Although this adds a little time to the overall operation of the program, it is done in the interest of safety and is worthwhile. You cannot destroy a document file, and the program only does what you want it to.

If you choose the proof option from the main menu, you will be prompted to insert your text disk in the appropriate drive. A list of all of the filenames on that disk is displayed on the screen, and you are asked to select one. Then your file is loaded, words are compared to the dictionary and the number of words not recognized — plus total words in the file — are shown. Once all of this counting and checking is performed, you are ready to check the spelling in your document.

In the middle of the screen are three options: continue scanning (C), make correction (M) and search (S). As the program scans through your file, the text is scrolled through a horizontal window at the bottom of the screen. Whenever a word is not recognized, the word is highlighted, and the scrolling stops. If the word is spelled correctly, just press

WHAT IS D:CHECK/C:CHECK?

Most program listings in **ANALOG** are followed by a table of numbers appearing as DATA statements, called "CHECKSUM DATA." These numbers are to be used in conjunction with D:CHECK and C:CHECK, which appeared in the **ANALOG Compendium** and Issue No. 16.

D:CHECK and C:CHECK are programs by Istvan Mohos and Tom Hudson. They are designed to find and correct typing errors when entering programs from the magazine. For those readers who do not have a copy of either article, send for a copy of back issue 16 ($4.00) or **The ANALOG Compendium** ($14.95 plus $2.00 shipping and handling) from:

ANALOG Computing
P.O. BOX 615
HOLMES, PA 19043

C, and the scanning continues. If you are unsure of the correct spelling, you can press S for the search function to find the word in the dictionary.

A very useful feature of **Spell Wizard** is its ability to use wild cards as part of the search criteria. For example, let's assume you did not know how many *m*'s or *t*'s there are in the word "committee." You do know that the word begins with *com*, so you could enter "com*" (the * is the wild card indicator). All the words in the dictionary that begin with *com* will be displayed on the screen. They scroll from bottom to top, and the space bar can be used to pause the display for a longer look.

This process of scanning, making corrections and searching continues until the program reaches the end of your document. At that point, you have several options. You can save the flagged words to a separate dictionary or combine them with an existing one. If you decide to use an existing dictionary, the words are inserted into the file alphabetically, and duplicates are not entered.

The first few times you use **Spell Wizard**, the flagged words will consist of technical terms, proper nouns and other words that are familiar to you but not to the dictionary. By saving these words in a separate dictionary and using that dictionary each time you use the program, fewer words will be flagged, and the speed of the checking process will be dramatically increased. When you save the words, you have the choice of either performing the save *en masse* or approving each entry. This is just another fine touch to this useful program.

Finally, when the checking is finished and you have saved the flagged words for your dictionary, you may save the corrected document. Either the original filename may be used, or you can supply a new name.

Spell Wizard is an easy-to-use program that has enough features to satisfy both the casual and the not-so-casual home writer.

Before I talk about the relative performance of each of these spelling checking programs, allow me a brief diversion. I have recently begun using a CP/M system, **Wordstar** and **Spellstar** (Micropro). When checking my text documents with **Spellstar**, the entire process seems to be quicker. This is due primarily to the program's ability to read dozens of words from the dictionary file each second, rather than the handful of words Atari programs are capable of managing.

Dictionary reading speed is only half of the crite-

(continued on page 34)

Touch-Tone® Dialer Update

by Tom Hudson

In ANALOG issue 19, we ran the **Touch-Tone® Dialer**, a program which allowed your computer to generate tones that would "dial" your phone. Unfortunately, some phone systems aren't as lenient as the one here at ANALOG and won't accept the tones as listed.

Warren P. Silberstein, M.D., of Baldwin, New York, sent in the following changes that should allow the **Dialer** to work properly for everyone. He has used the Atari's ability to combine two sound registers in order to give finer frequency control. The POKE in Line 90 sets up the fine-tune mode.

Simply add the following changes to the existing program, and you'll be dialing by computer in no time! □

```
80 DIM F1(11),F2(11),C1(11),C2(11),PN$
(20)
90 FOR X=0 TO 3:SOUND X,0,0,0:NEXT X:P
OKE 53768,120
100 FOR X=0 TO 11:READ A,B,D,E:F1(X)=A
:C1(X)=B:F2(X)=D:C2(X)=E:NEXT X
230 POKE 53762,C1(N):POKE 53760,F1(N):
POKE 53766,C2(N):POKE 53764,F2(N)
240 POKE 53767,168:POKE 53763,168:REM
*** LEAVE TONE ON A MOMENT ***
270 POKE 53767,0:POKE 53763,0
350 DATA 150,2,176,3
360 DATA 221,2,253,4
370 DATA 150,2,253,4
380 DATA 87,2,253,4
390 DATA 221,2,131,4
400 DATA 150,2,131,4
410 DATA 87,2,131,4
420 DATA 221,2,19,4
430 DATA 150,2,19,4
440 DATA 87,2,19,4
450 DATA 221,2,176,3
460 DATA 87,2,176,3
```

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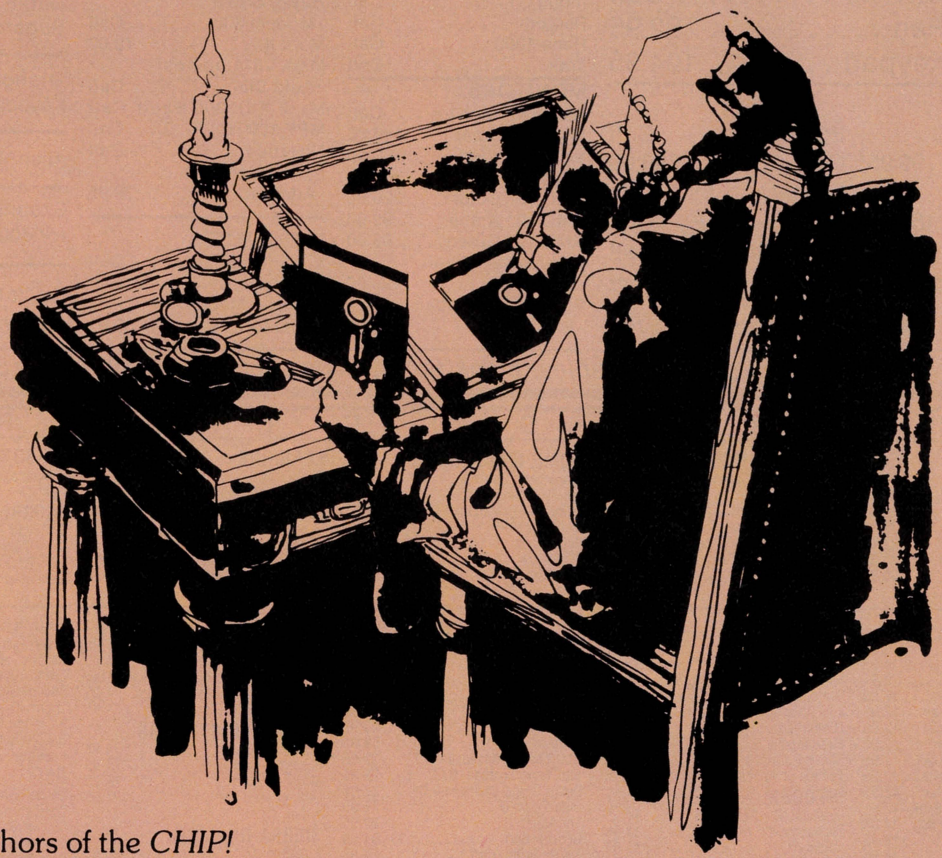

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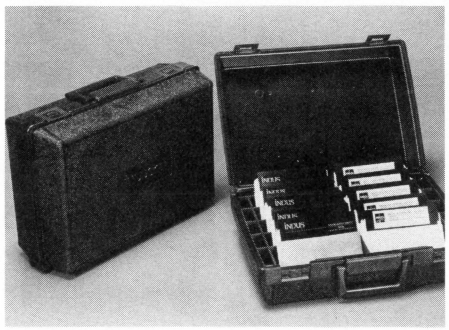

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☐ ☐ I currently own an Atari. Model # _____

☐ ☐ I currently own a disk drive. Brand: _____

☐ ☐ I currently own Miles Accounting System II modules. They are: _____

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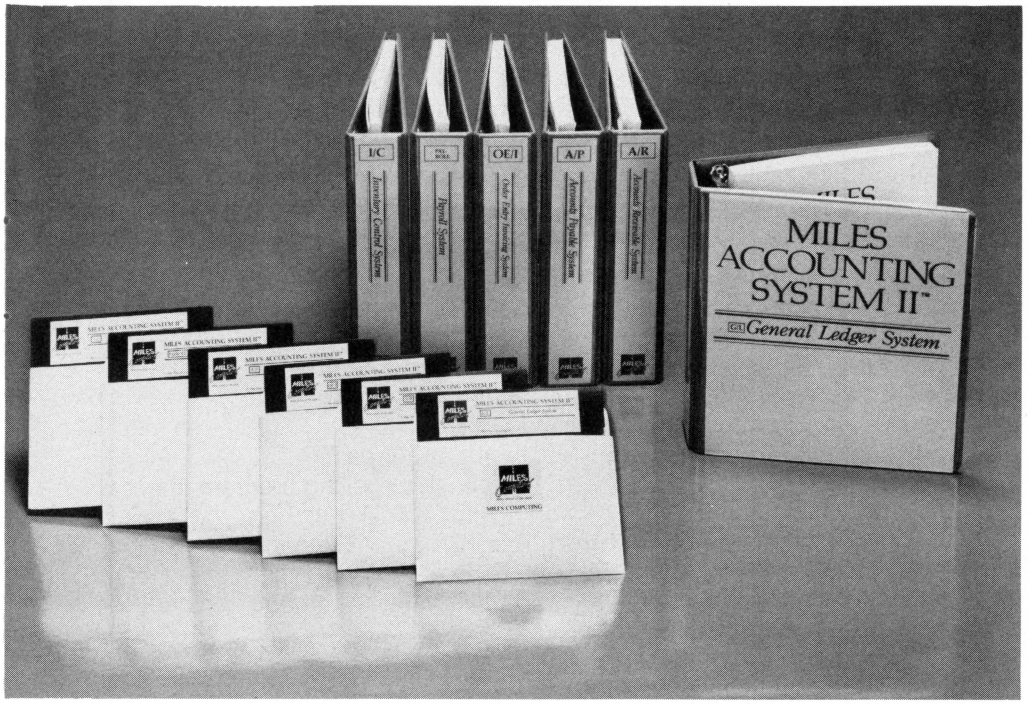

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User support is guaranteed because Miles Computing is a company that *cares* about its customers. That is evidenced by their willingness to show you before you buy. With that in mind, drop by your local computer store and see our self-running demonstration of the Miles Accounting System II.

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While part of the overall Accounting System, the Miles Payroll System is particularly esteemed. Here's what respected computer industry publications have to say about it:

InfoWorld
Report Card

Miles Payroll System

	Poor	Fair	Good	Excellent
Performance	☐	☐	☐	☑
Documentation	☐	☐	☐	☑
Ease of Use	☐	☐	☐	☑
Error Handling	☐	☐	☐	☑

"In all respects—features, performance, ease of use, documentation and support—this is a professionally conceived and executed program. We look forward to other business software from Miles Computing that will serve the needs of Atari owners."

"The performance of Miles Payroll system is excellent. It handles all its promised features quickly and easily. ...It is an easy-to-learn program that is very powerful."
—InfoWorld

"So much for the Atari's reputation of being a games-only machine."
—Desktop Computing

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Table 1.

	Atspeller	Spell Perfect	Spell Wizard
Price	$39.95	$79.95	$49.95
Requires (RAM)	48K	32K	32K
Features:			
Supports 2 drives	yes	yes	yes
Add corrections to:			
Master dictionary	no	yes	yes
User dictionary	yes	no	yes
Dictionary size	30K	30K	33K
Max. number user dictionaries	1	1/disk	limited to disk size
Output to:			
Screen	yes	yes	yes
Printer	yes	no	yes
Create new file	no	yes	yes
Re-write existing file	yes	yes	yes
Search dictionary	yes	yes	yes
Word proc. access	yes	yes	yes
Ignores types of words	no	yes, less than 4 letters	no
Backup prog. poss.	yes	yes	no
Performance:			
Total words in sample text file	1591	1233	1569
Time to: (seconds)			
Load program	36	10	34
Read file		29	24
Read dictionary	540	95	143
Total time	540	124	167
Words/minute	177	597	563

ria for judging a program of this type. Ease of use is the other criterion. The Atari spelling checking programs are much easier to work with than **Spellstar**. It is important to realize that there are tradeoffs with any program, and the choice finally comes down to deciding which program best suits your particular needs.

Table 1 lists the various features of each of the spelling checking programs. As can be seen, **Spell Perfect** is the fastest (597 words per minute) at checking my sample text file containing 1569 words. Since LJK's program ignores words of three letters or less, the word count was only 1233. **Atspeller** was the slowest, at only 177 words per minute. This is partly the result of the program's reading both the dictionary and text files alternately, and displaying the mismatches in reverse video on the screen.

The text file I used for the benchmark is representative of what I typically write, and I have only used the main dictionary for checking. Creating a user dictionary will speed up the checking process at the expense of lengthening the dictionary load ing time. Obviously, more or less unknown words will affect the performance of the program.

If only one disk drive is used with any of these programs, some disk swapping must occur. This is especially true when you decide to use the master dictionary to look up the spelling of a particular word. I rarely use this dictionary look-up feature. Instead, I keep a pocket Webster's dictionary close at hand — I find it faster and easier to use.

All of the programs described in this article are useful for checking your documents for spelling and typographical errors. As long as you keep in mind the inherent limitations of this type of program, any one will probably meet your casual writing needs. □

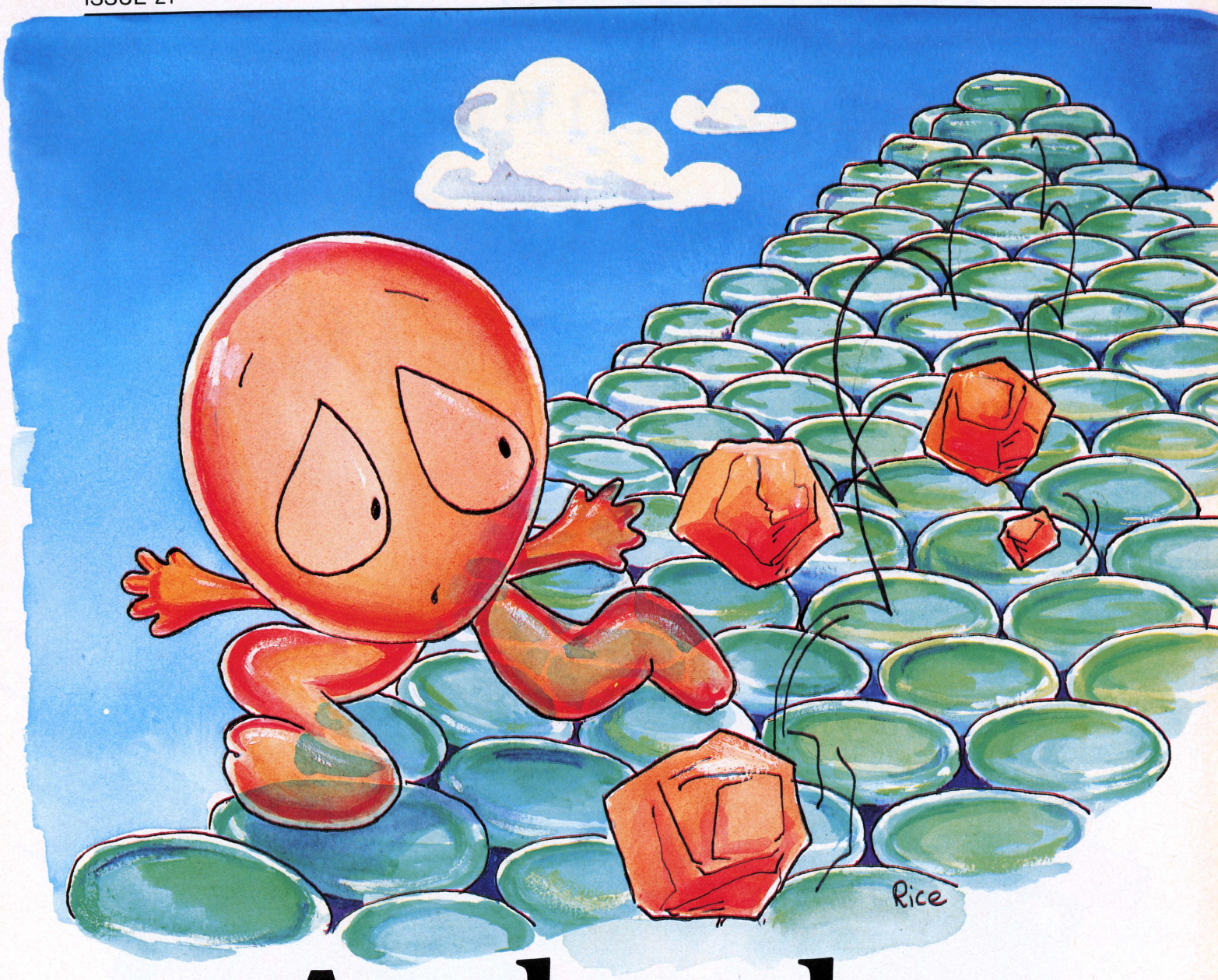
Software summary.

Name: ***Atspeller***
Type: Spelling Checking Program
System: Atari 400/800XL series
Format: Disk
Language: Machine Language
Summary: An inexpensive spelling program that works with Atari DOS files.
Manufacturer: Atari Program Exchange
P.O. Box 3705
Santa Clara, CA 95055
Price: $39.95

Name: ***Atspeller for AtariWriter***
Type: Spelling Checking Program
System: Atari 400/800XL series
Format: Disk
Language: Machine Language
Summary: An inexpensive spelling program that works with **AtariWriter.**
Manufacturer: Atari Program Exchange
P.O. Box 3705
Santa Clara, CA 95055
Price: $39.95

Name: ***Spell Perfect***
Type: Spelling Checking Program
System: Atari 400/800XL series
Format: Disk
Language: Machine Language
Summary: A usable spelling program for LJK format files.
Manufacturer: LJK Enterprises
7852 Big Bend Blvd.
St. Louis, MO 63119
(314) 962-1855
Price: $79.95

Name: ***Spell Wizard***
Type: Spelling Checking Program
System: Atari 400/800XL series
Format: Disk
Language: Machine Language
Summary: A useful spelling program for Atari DOS files. The best value.
Manufacturer: Datasoft, Inc.
9421 Winnetka Ave.
Chatsworth, CA 91311
(213) 701-5161
Price: $49.95



Avalanche

16K Cassette or 24K Disk

by Tommy Bennett

This month, **ANALOG** continues its custom of printing assembly-language games with **Avalanche**, a public-domain game of skill for one player.

Typing it in.

Before typing anything, look at the listings accompanying this article.

Listing 1 is the BASIC data and data checking routine. This listing is used to create both cassette and disk versions of **Avalanche**. The data statements are listed in hexadecimal (base 16), so the program will fit in 16K cassette systems. This makes typing more difficult, but it's a necessary evil.

Listing 2 is the assembly-language source code for **Avalanche**, created with the OSS MAC/65 assembler. You *do not* have to type this listing to play the game! It is included for those readers interested in assembly language.

Follow the instructions below to make either a cassette or disk version of **Avalanche**.

Cassette instructions.

1. Type Listing 1 into your computer using the BASIC cartridge, and verify your typing with **C:CHECK** (see page 27).

2. Type RUN and press RETURN. The pro-

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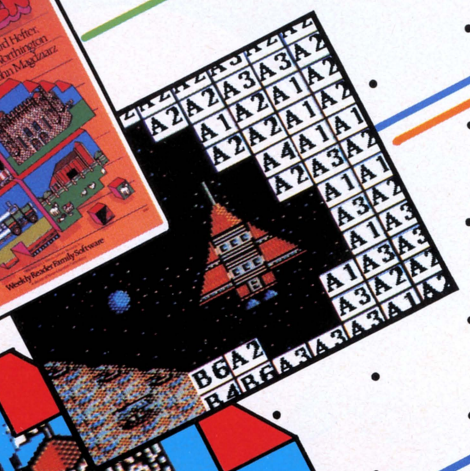

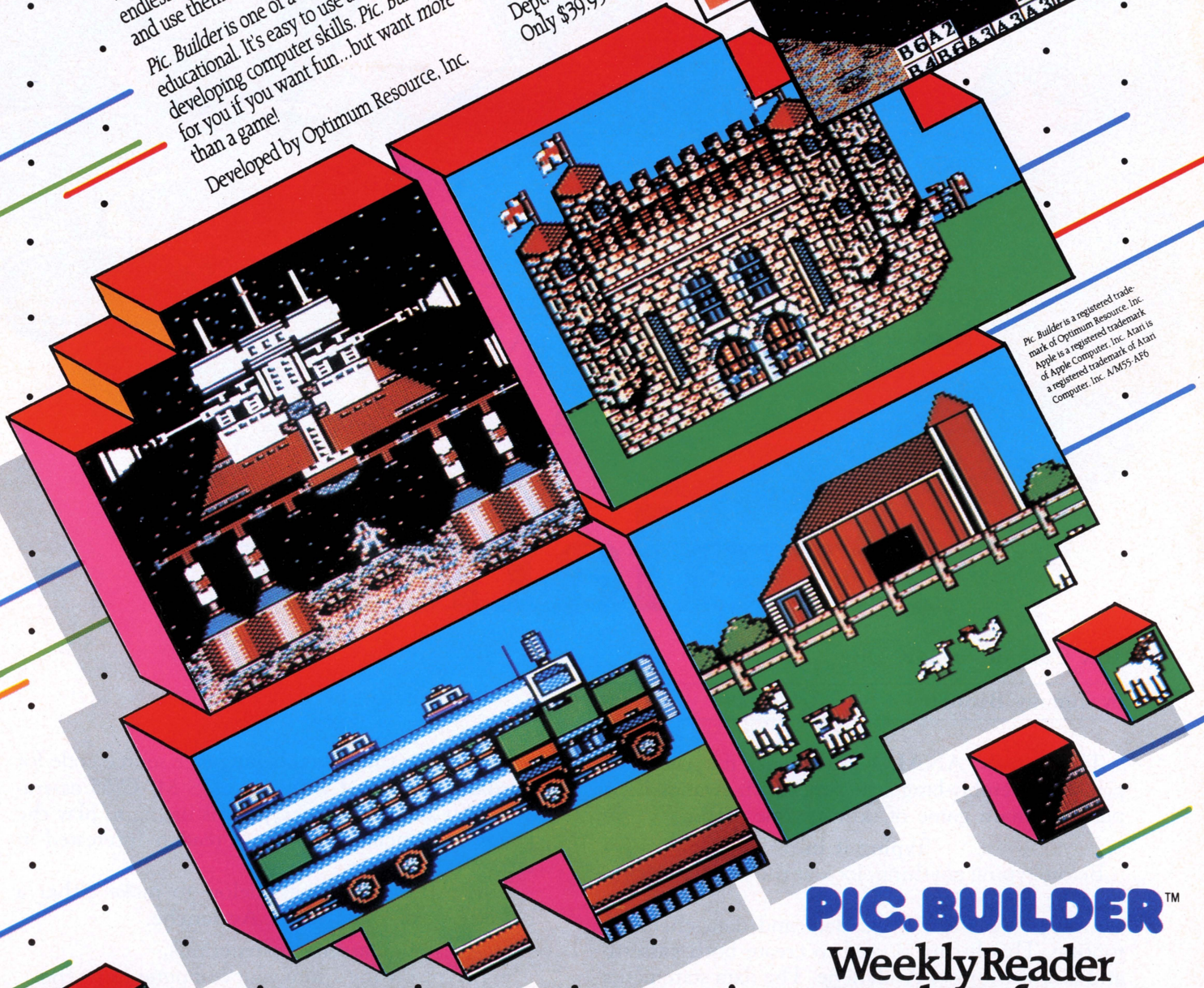

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gram will begin and ask:

```
MAKE CASSETTE (0) OR DISK (1)?
```

Type 0 and press RETURN. The program will begin checking the DATA statements, printing the line number of each as it goes. It will alert you if it finds any problems. Fix any incorrect lines and re-RUN the program, if necessary, until all errors are eliminated.

3. When all DATA lines are correct, the computer will beep twice and prompt you to "READY CASSETTE AND PRESS RETURN." Insert a blank cassette in your recorder, press the RECORD and PLAY buttons simultaneously and hit RETURN. The message "WRITING FILE" will appear, and the program will create a machine-language boot tape version of **Avalanche**, printing each DATA line number as it goes. When the READY prompt appears, the game is recorded and ready to play. CSAVE the BASIC program onto a separate tape before continuing.

4. To play the game, rewind the tape created by the BASIC program to the beginning. Turn your computer OFF and remove all cartridges. Press the PLAY button on your recorder and turn ON your computer, while holding down the START key. If you have a 600 or 800XL computer, you must hold the START and OPTION keys when you turn on the power. The computer will "beep" once. Hit the RETURN key, and **Avalanche** will load and run automatically.

Disk instructions.

1. Type Listing 1 into your computer using the BASIC cartridge, and verify your typing with **D:CHECK2** (see page 27).

2. Type RUN and press RETURN. The program will ask:

```
MAKE CASSETTE (0) OR DISK (1)?
```

Type 1 and press RETURN. The program will begin checking the DATA lines, printing the line number of each statement as it goes. It will alert you if it finds any problems. Fix incorrect lines and re-RUN the program, if necessary, until all errors are eliminated.

3. When all DATA lines are correct, you will be prompted to "INSERT DISK WITH DOS, PRESS RETURN." Put a disk containing DOS 2.0S into drive #1 and press RETURN. The message "WRITING FILE" will appear, and the

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program will create an AUTORUN.SYS file on the disk, displaying each DATA line number as it goes. When the READY prompt appears, the game is ready to play. Be sure the BASIC program is SAVEd before continuing.

4. To play the game, insert the disk containing the AUTORUN.SYS file into drive #1. Turn your computer OFF, remove all cartridges and turn the computer back ON. **Avalanche** will load and run automatically.

Playing the game.

Plug a joystick in port 1 and press the fire button to start the game. Up at the top of the screen is a letter "N," which stands for normal play. Pressing the OPTION key will switch this to an "H," which stands for hard play.

The object of **Avalanche** is to claim the whole side of the mountain as yours. You claim each square by moving Leroy onto a square and changing it to the object color. The object color is indicated by the flashing arrows in the upper left corner. On the first level, you just have to jump on a square once to change it to the object color. On level two, you must jump on it twice, and so on.

There are up to six different levels, each having four rounds. When you complete a round, you get a bonus of 1000 points. You'll receive 25 points for changing the color of a square.

While you're doing all this, you also have to avoid the falling rocks and Big George. Big George wears a baseball hat and will chase after you. The only way you can get rid of him is to make him follow you into the path of a rock. If a rock hits him, he is out of commission for now, but he'll be back soon. There's also a little green man called Henry. Henry won't hurt you, but he will change the color of the squares back to their original. To stop him, all you have to do is touch him — and you'll get 200 points.

You get an extra man at every 10,000 points. Leroy is moved via the joystick, in four diagonal directions. It may seem difficult to move at first, but you'll get used to it after a while. Happy gaming! □

BASIC listing.

```
10 REM *** AVALANCHE ***
20 TRAP 20:? "MAKE CASSETTE (0), OR DI
SK (1)";:INPUT DSK:IF DSK>1 THEN 20
30 TRAP 40000:DATA 0,1,2,3,4,5,6,7,8,9
,0,0,0,0,0,0,0,10,11,12,13,14,15
40 DIM DAT$(91),HEX(22):FOR X=0 TO 22:
READ N:HEX(X)=N:NEXT X:LINE=990:RESTOR
E 1000:TRAP 120:? "CHECKING DATA"
50 LINE=LINE+10:? "LINE:";LINE:READ DA
T$:IF LEN(DAT$)<>90 THEN 220
60 DATLIN=PEEK(183)+PEEK(184)*256:IF D
ATLIN<>LINE THEN ? "LINE ";LINE;" MISS
ING!":END
70 FOR X=1 TO 89 STEP 2:D1=ASC(DAT$(X,
X))-48:D2=ASC(DAT$(X+1,X+1))-48:BYTE=H
EX(D1)*16+HEX(D2)
80 IF PASS=2 THEN PUT #1,BYTE:NEXT X:R
EAD CHKSUM:GOTO 50
90 TOTAL=TOTAL+BYTE:IF TOTAL>999 THEN
TOTAL=TOTAL-1000
100 NEXT X:READ CHKSUM:IF TOTAL=CHKSUM
 THEN 50
110 GOTO 220
120 IF PEEK(195)<>6 THEN 220
130 IF PASS=0 THEN 170
140 IF  NOT DSK THEN 160
150 PUT #1,224:PUT #1,2:PUT #1,225:PUT
 #1,2:PUT #1,0:PUT #1,32:CLOSE #1:END
160 FOR X=1 TO 116:PUT #1,0:NEXT X:CLO
SE #1:END
170 IF  NOT DSK THEN 200
180 ? "INSERT DISK WITH DOS, PRESS RET
URN";:DIM IN$(1):INPUT IN$:OPEN #1,8,0
,"D:AUTORUN.SYS"
190 PUT #1,255:PUT #1,255:PUT #1,0:PUT
 #1,32:PUT #1,99:PUT #1,52:GOTO 210
200 ? "READY CASSETTE AND PRESS RETURN
";:OPEN #1,8,128,"C:":RESTORE 230:FOR
X=1 TO 40:READ N:PUT #1,N:NEXT X
210 ? :? "WRITING FILE":PASS=2:LINE=99
0:RESTORE 1000:TRAP 120:GOTO 50
220 ? "BAD DATA: LINE ";LINE:END
230 DATA 0,42,216,31,255,31,169,0,141,
47,2,169,60,141,2,211,169,0,141,231,2,
133,14,169,56,141,232,2
240 DATA 133,15,169,0,133,10,169,32,13
3,11,24,96
1000 DATA 2065E4A9008D08D2A9018584A9AE
858520CF2C20DA21208C23200F2320FA2220AD
23205D23A20FBDA6339D3E36,360
1010 DATA BDB6339DBA37BDC6339DCE37CA10
EBAD8402D013208C23200F2320FA22205D23A9
00854D4C8120AD1FD0C903D0,228
1020 DATA 19A585C9AED008A9A88585A901D0
06A9AE8585A900858420AA24A5858D0936A914
20D3214C3C2020BD2120C821,64
1030 DATA AD120609108D1236AD130609108D
2636A207BD74339D4236CA10F7A97820D32120
BD21A9148D0306AE1306BDD6,982
1040 DATA 338DD822BDDB338DE022BDE0338D
E522BDE5338DEA2220BC2320F124A9018D1406
20AD23AD2006C901F0034C7A,23
1050 DATA 21EE130620E323207924A900854D
AD1306C905D013EE1206A9018D1306AD120685
83200F234C1421A9008D0206,400
1060 DATA 200F234C812020C821A204BD7C33
9DBF37CA10F7AD120609108DC537A20BA9968D
00D2A9A88D01D2A91C8DD822,117
1070 DATA A9888DE022A90620D321A9328D00
D2A9888DD822A91C8DE022A90620D321CA10D0
A9008D01D220C821AD1206C9,195
1080 DATA 07D004A9068583A9008D20068D02
064C8120C902F0034C9B21C689A20FA9788D00
D28A09108D01D2A90520D321,414
1090 DATA CA10ED4CA221C689A9018D6F0220
7924A589D00EA208BD81339D4236CA10F74C3C
2020FA224C8120A213A9009D,121
1100 DATA 3C36CA10FA60A227A9009DB837CA
10FA608582A582D0FC60A200BD00E09D0038BD
00E19D0039CAD0F1A22FBDEA,942
1110 DATA 339D1838CA10F7A9388DF402A93E
8D2F02A9338D3102A9548D3002A9038D1DD0A9
388D07D4A9268DC002A9348D,623
1120 DATA C1028DC2028DC302A97C8D00D0A9
748D01D08D02D08D03D0A9018D6F02A90F8DC4
02A9288DC502A9888DC602A9,784
1130 DATA D68DC702A9228D0102A97D8D0002
A222A074A907205CE4A900AA9D00369DF036E8
E0F0D0F5A9C08D0ED460A582,393
1140 DATA F002C6824C62E448A9448D0AD48D
16D0A9228D0102A9928D000268404 8A9588D0A
D48D17D0A9228D0102A9A78D,269
1150 DATA 000268404 8A5CB8D0AD4C928D012
A90085CBA5CC1006A90085CCF004A98E85CCA5
CC8D16D0E6CBA9228D0102A9,692
1160 DATA D68D000268404 8A90E8D0AD48D16
D0A9FC8D17D0A9928D18D0A9428D19D0A9228D
0102A97D8D000268404 A9468D,628
1170 DATA 2836A95D8D2936A58938E9010910
8D2A3660A9368581A9A9858 0A9018586A486B9
1A3491808810F8A586186902,355
1180 DATA C90FF0128586A58018692785 80A5
81690085814C1B2320AA24A9008D12368D2636
A205BD90339D0C36BD96339D,791
```

```
1190 DATA 2036CA10F160A205A9109D0036BD
8A339D5036CA10F2A9348D6636A92F8D6736A9
078D8D36A9438D8E36A9448D,619
1200 DATA 8F36A9088D903660A9018D120685
838D1306A9048589A9008D1406A9028D5A06A9
608587A91085860A9008D01,774
1210 DATA D28D03D28D05D28D07D260A583C9
01F004C904D007ADE0228D942260C902F004C9
05D007ADE5228D942260ADEA,290
1220 DATA 228D942260A214BD28348D00D2A9
AA8D01D2BD3D3420D32120E624CA10E9A23C8E
00D220E624A90220D321E8E8,358
1230 DATA E8E05190EE8E00D220E624A90220
D321CACACAE039D0EEA9008DC802A9608587A2
0A8A09A08D01D2A90420D321,32
1240 DATA CA10F2A9008D01D2A209BD9C339D
BD37CA10F7AD1C06186901C91AD018AD1B0618
6901C91AD00EAD1B06186901,363
1250 DATA 8D1B068D0136A9108D1C068D0236
A9C820D32160AD0136C588F002B00160E688E6
8920FA22A202A9208D00D2A0,32
1260 DATA 0F9809A08D01D2A90320D3218810
F2CA10EDA9008D01D260A5848D1C258D3325AD
1206C903D011AD1306C901F0,632
1270 DATA 04C903D006A9008D332560AD1206
C907D006A9008D1C2560C908F0E9C90990EAA9
008D1C25F0DEA58718690285,309
1280 DATA 878DC80260203220C20E32CAD2006
C900F00160AD2A06C901D0062058254C1525AD
78028D3106205825200226AD,882
1290 DATA 5706C901D00BA9008D5706204D27
4C2F25A9018D5706AD5806C901D00BA9008D58
062080254C4625A9018D5806,388
1300 DATA 20CA28200C3220453120262C2060
314CF724AD2606C901D00160AD3106C909D003
4C0E2FC905D0034C282FC906,853
1310 DATA D0034C5C2FC90AD0034C422F60AD
2706C901D00160AD3206C950F004EE320660AD
3606C901D00034CF525AD3906,95
1320 DATA C901F00EAD0AD2300160A9018D39
0620BA2EAD4206C901D0034CDE2520F42F20F4
2F20F42F20F42FAD0B06C96D,512
1330 DATA B00160A9018D42068D2706A9AF8D
2E0660A9018D3606AD0AD23008A9008D3C064C
F525A9018D3C06AD3C06C901,359
1340 DATA D0034CB82F4CCC2FAD2806C901D0
0160AD3306C928F004EE330660AD4606C901D0
034CC826AD3406C901D0034C,732
1350 DATA 5326AD1306C902D0034C3A26C904
F0034C5326AD4506C932F012AD4706C9029008
AD0AD23006EE45064CC826AD,894
1360 DATA 3706C901D0034CBB26AD3A06C901
F014AD0AD2300160A9018D3A068D3406EE4706
20CC2EAD4306C901D0034CA4,976
1370 DATA 2620493020493020493020493020
0C06C96DB00160A9018D43068D2806A9AF8D2F
0660A9018D3706AD0AD23008,426
1380 DATA A9008D3D064CBB26A9018D3D06AD
3D06C901D0034C0D304C2130A9018D4606A900
8D4706AD4C06C901D0034C40,11
1390 DATA 27AD4B06C901F008A9018D4B0620
502DAD4D06C901D0034C172720493020493020
493020493020AD0C06C968B001,395
1400 DATA 60A9018D4D068D2806A9AF8D2F06
60A9018D4C06EE4A06EE4A06AD0AD2300EA900
8D4806EE490620502D4C4027,231
1410 DATA A9018D4806CE490620682DAD4806
C901D0034C0D304C2130AD2906C901D00160AD
5006C901D0034CF727AD3506,37
1420 DATA C901D0034C8227AD1306C903B003
4C8227AD4E06C9029008AD0AD230034CF727AD
3806C901D0034CEA27AD3B06,174
1430 DATA C901F014AD0AD2300160A9018D3B
068D3506EE4E0620ED2EAD4406C901D0034CD3
2720DE3020DE3020DE3020DE,533
1440 DATA 30AD0D06C96DB00160A9018D4406
8D2906A9AF8D300660A9018D3806AD0AD23008
A9008D3E064CEA27A9018D3E,486
1450 DATA 06AD3E06C901D0034C64304C7830
A9018D5006AD5306C901D0034CAF28AD5106C9
01F008A9018D510620B12DAD,512
1460 DATA 5206C901D0034C412820DE3020DE
3020DE3020DE30AD0D06C962B00160A9018D52
068D2906A9AF8D300660A901,558
1470 DATA 8D5306AD0006CD0406B032AD0106
CD0506F016901420B12DCE0406EE0506EE0506
A9008D4F064CAF2820DE2DCE,389
1480 DATA 0406CE0506CE0506A9028D4F064C
AF28AD0106CD0506F016901420C92DEE0406EE
0506EE0506A9018D4F064CAF,14
1490 DATA 2820F32DEE0406CE0506CE0506A9
038D4F06AD4F06C900D0034C6430C901D0034C
7830C902D0034C8C304CA030,967
1500 DATA AD2606C901F0034CF029AD2D068D
01D2CE2D06AD2D06C9A0F0034CF029A9008D01
D28D26068D2A06A9088D0E06,237
1510 DATA AD04D0C900D00420732E6020DD2B
AD1206C901D0034C3C29C902D0034C4C29C903
D0034C7F29C904D0034C6629,308
1520 DATA C905D0034CA329C906D0034CC629
C907D0034C7F294CC629AD04D0C901D006EE02
06202A314CF029AD04D0C901,830
1530 DATA D006202A314CF029C902D006EE02
062033314CF029AD04D0C901D009EE0206202A
314CF029CE0206202A314CF0,841
1540 DATA 29AD04D0C901D006202A314CF029
C902D0062033314CF029C904D056EE0206203C
314CF029AD04D0C901D00620,145
1550 DATA 2A314CF029C902D009EE02062033
314CF029CE0206202A314CF029AD04D0C901D0
06202A314CF029C902D00620,172
1560 DATA 33314CF029C904D009EE0206203C
314CF029CE0206203331A200A000207F2BAD24
06C901F0034C1A2AAC0B06A2,820
1570 DATA 008A99003DE8C8E00AD0F7A9008D
3206A20020B82BAD4606C901D0034CBE2AA201
A002207F2BAD2406C901F003,237
1580 DATA 4C512AAC0C06A2008A99003EE8C8
E00AD0F7A9008D33068D3406A20120B82BAD50
06C901F029A202A004207F2B,522
1590 DATA AD2406C901F00160AC0D06A2008A
99003FC8E8E00AD0F7A9008D3506A20220B82B
60AD2906C901F00160AD3006,978
1600 DATA 8D07D2CE3006AD3006C9A0F00160
AD07D0C900D00CA9058D2306206E3220DA3160
A9008D07D28D29068D5306A9,387
1610 DATA 088D110660AD2806C901F0034C51
2AAD2F068D05D2CE2F06AD2F06C9A0F0034C51
2AA9008D05D2AD06D0C900D0,709
1620 DATA 3220802DA9008D4B068D4D068D46
068D4C068D28068D3306A90A8D4A06A9088D49
068D1006A92D8D0C06A9748D,163
1630 DATA 02D08D090660A9008D28068D4C06
A9088D1006AD06D0C901D001602049 2BA94C85
8AA933858BAD49068D5906AD,255
1640 DATA 4A068D5A0620282E60AD1206C901
F013C902F017C903F01BC904F007C905F00B4C
732BAD06D0C902F01160AD06,646
1650 DATA D0C904F00960AD06D0C908F00160
CE020660BD2706C901F00160BD2E069903D2DE
2E06BD2E06C9A0F00160A900,409
1660 DATA 9903D2BD05D0C900D006A9018D24
0660A9009D27069D3606A9089D0F0660A9009D
36069D27069D39069D42068D,258
1670 DATA 2406A9089D0F06A92D9D0B06BD54
069D01D09D080660AD3106C909F00DC905F013
C906F023C90AF01560CE0006,373
1680 DATA EE0106EE010660EE0006EE0106EE
010660CE0006CE0106CE010660EE0006CE0106
CE010660AD00068D5906AD01,878
1690 DATA 068D5A0660A2FFAC030688D0FDCA
D0F760AD1406C900D011A9008D0206A910A200
9D1A06E8E006D0F8A900A200,893
1700 DATA 9D2006E8E064D0F8A9088D0E068D
0F068D10068D1106A9098D0006A9088D0106A9
0A8D04068D05068D4A06A908,457
1710 DATA 8D4906A97C8D06068D00D0A9558D
0706A9748D08068D09068D01D08D02D08D5406
8D5506A9848D0A068D56068D,472
1720 DATA 03D0A92D8D0B068D0C068D0D0618
A9AA8D00D2690A8D02D2690A8D04D2690A8D06
D2A9018D1ED0A900A2FF9D00,790
1730 DATA 3C9D003D9D003E9D003FCAD0F160
AD2506C909F011AC0706A200BDA43299003CC8
E8E010D0F460AD2506C905F0,782
1740 DATA 1420A02DAC0706A200BDB4329900
3CC8E8E010D0F460AD2506C90AF01420A02DAC
0706A200BDC43299003CC8E8,589
1750 DATA E00FD0F460AD2506C906F01420A0
2DAC0706A200BDD33299003CC8E8E00FD0F460
20802DAC0C06A200BDE23299,700
1760 DATA 003EE8C8E00DD0F420902D602080
2DAC0C06A200BDEE3299003EC8E8E00DD0F420
902D60AC0C06A2008A99003E,592
```

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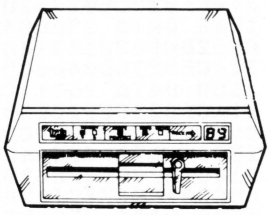

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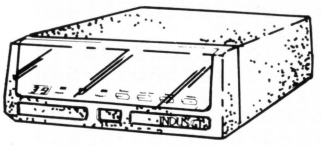

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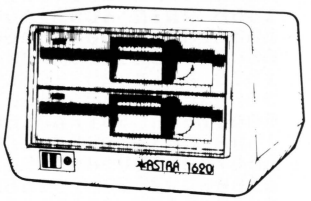
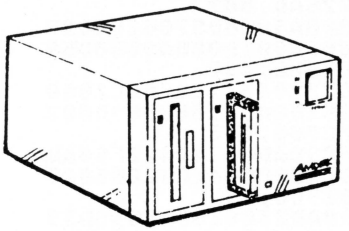


This drive packs a lot of storage into a small package which is only a little larger than the Atari 810 drive. It features two (2) double-density drives with the storage capacity of four (4) Atari 810's! It offers two (2) I/O ports to allow daisy-chaining of another drive or other peripherals, and the colors of the housing match the new XL series computers. All in all, this is a whole lot of disk storage for the money. Includes DOS-XL.



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- **3" MICRO-FLOPPY**
- **PRINTER PORT**
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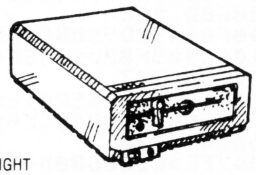

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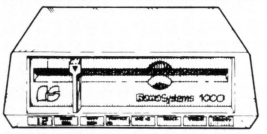

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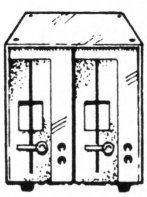

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```
1770 DATA E8C8E00FD0F760A90D8D1506A90B
8D2106A9C68DC20260AC0706A200A90099003C
C8E8E014D0F76020182EAC0D,567
1780 DATA 06A200BDFA3299003FC8E8E012D0
F420082E6020182EAC0D06A200BD0C3399003F
C8E8E012D0F46020182EAC0D,180
1790 DATA 06A200BD1E3399003FC8E8E012D0
F46020182EAC0D06A200BD303399003FC8E8E0
12D0F460A9138D1606A9108D,920
1800 DATA 1706A9568DC30260AC0D06A2008A
99003FC8E8E014D0F760AD5A0685804A9008581
06800680A580858C06800680,635
1810 DATA 2681A5801865BC8580A581690085
81A580186D59068580A5816900858 1A5801869
008580A5816936858 1A001B1,461
1820 DATA 8A918088B18A918060A9048D6F02
A9028D0306204B31A9AA8D01D2AD07068D00D2
C9F0F009209F2F20262C4C85,75
1830 DATA 2EA96F8D01D218A9828D00D26901
20262CC9D2D0F4A9008D00D28D01D2A9038D20
0660AC0B06A200BD42339900,639
1840 DATA 3DC8E8E00AD0F460AC0C06A200BD
423399003EE8C8E00AD0F4A90A8D1506A9088D
2106A9348DC20260AC0D06A2,616
1850 DATA 00BD423399003FC8E8E00AD0F4A9
0A8D1606A9088D1706A9348DC3026020E32CA9
018D2A0620762F209F2F209F,894
1860 DATA 2FCE0E06D00320F9306020FC2CA9
018D2A0620802F209F2F209F2FCE0E06D00320
F930602018DA9018D2A0620,527
1870 DATA 762F208A2F208A2FCE0E06D00320
F930602034 2DA9018D2A0620802F208A2F208A
2FCE0E06D00320F93060CE06,191
1880 DATA 06AD06068D00D060EE0606AD0606
8D00D060AC0706A200B9003C99FF3BE8C8E011
D0F4CE070660A20018AD0706,578
1890 DATA 690EA8B9003C99013C88E8E011D0
F4EE07066020E02F20F42F20F42FCE0F06D005
A200200D316020EA2F20F42F,109
1900 DATA 20F42FCE0F06D005A200200D3160
CE0806AD08068D01D060EE0806AD08068D01D0
60A20018AD0B066908A8B900,804
1910 DATA 3D99013D88E8E00AD0F4EE0B0660
2035302049302049304CE1006D005A201200D31
60203F3020493020493 0CE10,389
1920 DATA 06D005A201200D3160CE0906AD09
068D02D060EE0906AD09068D02D060A20018AD
0C066D2106A8B9003E99013E,861
1930 DATA 88E8EC1506D0F3EE0C066020B430
20DE3020DE30CE1106D005A202200D316020BE
3020DE3020DE30CE1106D005,271
1940 DATA A202200D316020B43020C830 20C8
30CE1106D005A202200D316020BE3020C83020
C830CE1106D005A202200D31,771
1950 DATA 60CE0A06AD0A068D03D060EE0A06
AD0A068D03D060AC0D06A200B9003F99FF3EC8
E8EC1606D0F3CE0D0660A200,318
1960 DATA 18AD0D066D1706A8B9003F99013F
88E8EC1606D0F3EE0D0660A9018D26068D2A06
A9AF8D2D06AD31068D250660,329
1970 DATA A9019D2706A9AF9D2E0660A94C85
8AA933858B2019322019 2C20282E60A94E858A
A9334C1E31A950858AA9334C,489
1980 DATA 1E31A952858AA9334C1E31A9018D
1ED060A9008D03D28D02D28D05D28D04D28D07
D28D06D260AD0CD0C9019038,303
1990 DATA C904D015AD4606C901D00E20E72A
A9028D2306206E324C9F31AD0CD0C908D007AD
5006C901F011AD2C06C904F0,747
2000 DATA 04EE2C0660A9028D200660A9008D
2C06AD5006C901D060AD0FD0C901D011AD2B06
C904F004EE2B0660A9028D20,927
2010 DATA 0660A9008D2B06AD0FD0C902903C
C904D007AD4606C901F03120182EA9008D5006
8D29068D52068D51068D4E06,719
2020 DATA 8D5306A90A8D04068D0506A9088D
1106A92D8D0D06A9848D0A068D03D060AD0206
C91CD005A9018D200660A005,285
2030 DATA 18B91A066905C91AD015A9109900
36991A0688B91A061869 01991A064C4332A915
990036991A0688B91A061869,594
2040 DATA 02C91AF0079900 36991A0660A910
990036991A0688B91A06186901C91AF0ED9900
36991A0660A00318B91A066D,323
2050 DATA 2306C91A902238E91A8D22061 8A9
106D2206990036991A06A9008D22068818B91A
066901C91AF0E4990036991A,929
2060 DATA 06600C1E3F2B2B3F2B371E1E1212
1B366C483078FCD4D4FCD4EC78784848D86C36
120E1F37371F0F1F1F0E0A2E,397
2070 DATA 3E1B0D0470F8ECECF8F0F8F87050
747CD8B020A050283C7E6A7E763C3C2436050A
143C7E567E6E3C3C246C0C1E,50
2080 DATA 1EFF2B2BFFFF2D333F1E12121B36
6C00307878FFD4D4FFFFB4CCFC784848D86C36
000C1E1EFF2F2FFF7F2F1F3F,44
2090 DATA 1E12127E361B00307878FFF4F4FF
FEF4F8FC7848487E6CD800183C7EFFFFFF7E3C
1800030443448384C3C47070,520
2100 DATA 7046003606068606868686060606
0606060606060606060606060606415433B2A5A1
A4B98085852C6536652CA7A1,525
2110 DATA ADA580AFB6A5B22328212E2725EC
E5F6E5EC9AF2EFF5EEE49AA2AFAEB5B3001110
1010000000021362 12C212E,776
2120 DATA 2328250000000223900342F2D2D39
0022252E2E253434A1AEA1ACAFA780A3AFADB0
B5B4A9AEA7000F5A049C0086,624
2130 DATA F60C92001AA4765400C442226603
0F3F7F3F0F0300C0F0FCFEFCF0C00000060C18
300060000C1E3F2B3F1E1236,228
2140 DATA 080C7E7F7E0C080010307EFE7E30
1000030403040304030403040304 3C2F00
2F3C483C00484048404840 00,84
2150 DATA 5148514851480B0E070B07070707
0707070707070707070707070700000000000000
0000000000000000000000000,705
```

CHECKSUM DATA

(see page 27)

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10 DATA 18,351,496,811,423,729,200,603
,555,573,694,613,29,205,214,6514
160 DATA 144,198,962,780,491,30,155,10
4,169,621,862,946,668,12,442,6584
1060 DATA 897,714,690,840,986,912,855,
905,987,65,924,599,637,973,536,11520
1210 DATA 956,795,134,916,723,663,761,
550,629,542,866,739,857,897,731,10759
1360 DATA 841,601,905,501,765,733,777,
790,893,765,712,804,963,768,75,10893
1510 DATA 627,818,575,726,564,591,782,
715,784,620,799,814,787,770,700,10672
1660 DATA 602,821,759,837,828,696,8,89
5,818,915,24,855,818,737,638,10251
1810 DATA 395,770,633,883,808,799,667,
838,693,690,445,628,626,337,58,9270
1960 DATA 980,696,978,978,734,680,679,
610,539,565,82,167,544,7,277,8516
2110 DATA 887,728,736,381,774,3506
```

Assembly language listing.

```
;*****************************
;*                           *
;* 'AVALANCHE'               *
;* written by: TOMMY BENNETT *
;*                           *
;*****************************
;
;OS SYMBOLS !!!
;
COLPM0  =   $02C0   ;P/M COLORS
COLPM1  =   $02C1
COLPM2  =   $02C2
COLPM3  =   $02C3
COLPF0  =   $02C4   ;PLAYFIELD COLORS
COLPF1  =   $02C5
COLPF2  =   $02C6
COLPF3  =   $02C7
COLBK   =   $02C8
CHBASE  =   $02F4   ;CHAR. SET ADDRESS
HPOSP0  =   $D000   ;P/M HORIZONTAL
HPOSP1  =   $D001   ;REGISTERS
HPOSP2  =   $D002
HPOSP3  =   $D003
P0PF    =   $D004   ;COLLISION
P1PF    =   $D005   ;REGISTERS
P2PF    =   $D006
P3PF    =   $D007
P0PL    =   $D00C
P3PL    =   $D00F
GRACTL  =   $D01D   ;GRAPHICS CONTROL
HITCLR  =   $D01E   ;COLLISION CLEAR
WSYNC   =   $D40A   ;WAIT FOR SYNC
NMIEN   =   $D40E   ;INTERRUPT ENABLE
PRIOR   =   $026F   ;PRIORITY
DMACTL  =   $022F   ;DMA CONTROL
AUDF1   =   $D200   ;AUDIO
AUDC1   =   $D201   ;REGISTERS
AUDF2   =   $D202
```

```
AUDC2   =   $D203
AUDF3   =   $D204
AUDC3   =   $D205
AUDF4   =   $D206
AUDC4   =   $D207
AUDCTL  =   $D208
SETVBV  =   $E45C   ;VBLANK SET
XITVBV  =   $E462   ;VBLANK EXIT
SIOINV  =   $E465   ;SIO INIT
CONSOL  =   $D01F   ;CONSOLE KEYS
PCOLR2  =   $02C2   ;P/M COLOR
PCOLR3  =   $02C3   ;
STICK0  =   $0278   ;STICK
STRIG   =   $0284   ;STICK TRIGGER
RANDOM  =   $D20A   ;RANDOM #
ATRACT  =   $4D     ;ATTRACT MODE FLAG
PMBASE  =   $D407   ;P/M ADDRESS
DLISTL  =   $0230   ;DISPLAY...
DLISTH  =   $0231   ;LIST ADDR
PMAREA  =   $3000   ;P/M MEMORY
PLAY0   =   PMAREA+$0400
PLAY1   =   PMAREA+$0500
PLAY2   =   PMAREA+$0600
PLAY3   =   PMAREA+$0700
DISP    =   $3600   ;DISPLAY MEMORY
DISP1   =   DISP+20
DISP2   =   DISP+40
DISP3   =   DISP+60
DISP4   =   DISP+80
DISP5   =   DISP+100
DISP7   =   DISP+140
DISP22  =   DISP+440
CHSET   =   $3800   ;CHAR. SET ADDR
;
;PAGE 0 VARIABLES
;
        *=  $80
LO      *=  *+1     ;2-BYTE...
HI      *=  *+1     ;WORK ADDRESS
TIMER   *=  *+1     ;EVENT TIMER
LVL     *=  *+1     ;LEVEL #
OPT     *=  *+1     ;OPTION KEY FLAG
TOG     *=  *+1     ;EASY/HARD VALUE
PADCT   *=  *+1     ;JUMPING PAD INDEX
COLR    *=  *+1     ;COLOR WORK REG.
PNT     *=  *+1     ;
TOM     *=  *+1     ;LIVES
FILE    *=  *+2     ;PAD COLOR POINTER
TIMES4  *=  *+1     ;PLOT WORK AREA
;
;USER SYMBOLS !!!
;
        *=  $0600
PCOL    *=  *+1     ;PL COL #
PROW    *=  *+1     ;PL ROW #
NUMSQ   *=  *+1     ;# OF SQ'S
TIME    *=  *+1     ;DELAY TIM
SCOL    *=  *+1     ;SNK COL #
SROW    *=  *+1     ;SNK ROW #
PXPOS   *=  *+1     ;PL XPOS
PYPOS   *=  *+1     ;PL YPOS
XPOSP1  *=  *+1     ;POSITIONS
XPOSP2  *=  *+1     ;OF
XPOSP3  *=  *+1     ;PLAYERS..
YPOSP1  *=  *+1     ;
YPOSP2  *=  *+1     ;
YPOSP3  *=  *+1     ;
COUNT1  *=  *+1     ;
COUNT2  *=  *+1     ;
COUNT3  *=  *+1     ;
COUNT4  *=  *+1     ;
LEVEL   *=  *+1     ;
ROUND   *=  *+1     ;
START   *=  *+1     ;
LENGTH  *=  *+1     ;
LENGTH3 *=  *+1
ADDNUM3 *=  *+1
PLAYER  *=  *+2
SCORE   *=  *+6     ;SCORE DIGITS
BACK    *=  *+1     ;PLAY END REASON
ADDNUM  *=  *+1
ADD     *=  *+1
SUM     *=  *+1     ;SCORE ADD VALUE
FALOFF  *=  *+1     ;FALL FLAG
DIRFLG  *=  *+1     ;DIRECTION FLAG
SG1FLG  *=  *+1     ;SOUND FLAGS
SG2FLG  *=  *+1
SG3FLG  *=  *+1
SG4FLG  *=  *+1
MOVFLG  *=  *+1     ;MOVE FLAG
WARN    *=  *+1
WARN1   *=  *+1
PITCH1  *=  *+1     ;PITCH FLG
PITCH2  *=  *+1     ;
PITCH3  *=  *+1     ;
PITCH4  *=  *+1     ;
DIRECT  *=  *+1     ;DIRECTION SAVE
DRP1    *=  *+1     ;DROP FLAGS
DRP2    *=  *+1
BAL1FLG *=  *+1     ;ROCK FLAGS
BAL2FLG *=  *+1
B1MOV   *=  *+1     ;ROCK MOV
B2MOV   *=  *+1     ;FLAG'S..
B3MOV   *=  *+1
B1DRP   *=  *+1
B2DRP   *=  *+1
B3DRP   *=  *+1
B1DIR   *=  *+1
B2DIR   *=  *+1
B3DIR   *=  *+1
B1DRW   *=  *+1
B2DRW   *=  *+1
B3DRW   *=  *+1
FNB1DRP *=  *+1
FNB2DRP *=  *+1
FNB3DRP *=  *+1
MAN     *=  *+1     ;GREEN MAN
GRNFLG  *=  *+1     ;GREEN MAN PRESENT
OUTFLG2 *=  *+1
GRNDIR  *=  *+1     ;GREEN DIRECTION
GCOL    *=  *+1     ;GREEN MAN COLUMN
GROW    *=  *+1     ;GREEN MAN ROW
GRNDRP  *=  *+1     ;GREEN DROP FLAG
GRNMOV  *=  *+1     ;GREEN MOVE FLAG
GRNFNDRP *= *+1     ;GREEN DROP FINISH
OUTFLG  *=  *+1
GRDIR   *=  *+1     ;GEORGE DIRECTION
GRGFLG  *=  *+1     ;GEORGE PRESENT
GRGDRP  *=  *+1     ;GEORGE DROP
FNGRDRP *=  *+1     ;GEORGE DROP FINISH
GRGMOV  *=  *+1     ;GEORGE MOVE FLAG
HPOS    *=  *+3     ;TMP LOC..
TEMP    *=  *+1
TEMP1   *=  *+1
COL     *=  *+1     ;PLOT COLUMN
ROW     *=  *+1     ;PLOT ROW
;
;AVALANCHE CONTROL CODE
;
        *=  $2000
STRTIT  JSR SIOINV  ;INIT SOUNDS
        LDA #0      ;SET AUDIO CONTROL
        STA AUDCTL
        LDA #1      ;SET EASY MODE
        STA OPT
        LDA #174
        STA TOG
        JSR PMCLR
        JSR SETCHR  ;SET UP CHARSET
        JSR INILVL  ;SET LEVEL INFO
        JSR SCREEN  ;INIT SCREEN
        JSR SHOLIV  ;SHOW LIVES
        JSR SNDOFF  ;NO SOUNDS
        JSR ZEROSC  ;ZERO SCORE
        LDX #15     ;DISPLAY...
SETAUTH LDA TITLE,X ;TITLE,
        STA DISP3+2,X
        LDA AUTHOR,X ;AUTHOR,
        STA DISP22+2,X
        LDA MAGMSG,X ;MAGAZINE
        STA DISP22+22,X
        DEX
        BPL SETAUTH
CKSTRG  LDA STRIG   ;TRIG PRESSED?
        BNE NOSTRG  ;NO!
        JSR INILVL  ;INIT LEVEL
        JSR SCREEN  ;INIT SCREEN
        JSR SHOLIV  ;SHOW LIVES
        JSR ZEROSC  ;ZERO SCORE
        LDA #0      ;NO ATTRACT MODE
        STA ATRACT
        JMP READY   ;GO TO IT!
NOSTRG  LDA CONSOL  ;GET CONSOLE
        CMP #3      ;OPTION PRESSED?
        BNE SHODIF  ;NO!
        LDA TOG     ;GET DIFFICULTY
        CMP #174    ;NORMAL?
        BNE NORMAL  ;NO, SET NORMAL
        LDA #168    ;SET HARD
        STA TOG
        LDA #1
        BNE SETDIF
NORMAL  LDA #174    ;NORMAL DIFFICULTY
        STA TOG
        LDA #0
SETDIF  STA OPT     ;SAVE DIFF
        JSR STODIF  ;AND INITIALIZE
SHODIF  LDA TOG     ;GET DIFF CHAR
        STA DISP+9  ;SHOW ON SCREEN
        LDA #20     ;WAIT 20 JIFFIES
        JSR WAIT
        JMP CKSTRG  ;LOOP BACK
READY   JSR CLINE3  ;CLEAR SCREEN LINE 3
        JSR CLINE22 ;AND LINE 22
        LDA LEVEL   ;GET LEVEL
        ORA #$10
        STA DISP+18 ;SHOW ON SCREEN
        LDA ROUND   ;GET ROUND
        ORA #$10
        STA DISP1+18 ;SHOW ON SCREEN
        LDX #7      ;SHOW READY!
SHORDY  LDA RDYMSG,X
        STA DISP3+6,X
        DEX
        BPL SHORDY
        LDA #120    ;WAIT 120 JIFFIES
        JSR WAIT
        JSR CLINE3  ;ERASE LINE 3
        LDA #20
        STA TIME
        LDX ROUND   ;GET ROUND #
        LDA R1SET,X ;AND SET COLORS
        STA DLI4C1+1
        LDA R2SET,X
        STA DLI4C2+1
        LDA R3SET,X
        STA DLI4C3+1
        LDA R4SET,X
        STA DLI4C4+1
        JSR SETLD   ;INIT DIFF FACTORS
        JSR GAME    ;GO TO MAIN GAME
        LDA #1      ;RESET START FLAG
        STA START
        JSR SNDOFF  ;TURN OFF SOUND
        LDA BACK    ;GET PLAY END REASON
        CMP #1      ;SCREEN COMPLETED?
        BEQ LVLEND  ;YES!
        JMP CKDED2  ;NO, CHECK DEATH
LVLEND  INC ROUND   ;NEXT ROUND
        JSR BONUS   ;DO BONUS
        JSR BONLIF  ;CHECK BONUS LIFE
        LDA #0      ;NO ATTRACT MODE
        STA ATRACT
        LDA ROUND   ;GET ROUND #
        CMP #5      ;ROUND 5?
        BNE NOTR5   ;NO!
        INC LEVEL   ;NEXT LEVEL!
        LDA #1      ;RESET ROUND #
        STA ROUND
        LDA LEVEL   ;SAVE LEVEL #
        STA LVL
        JSR SCREEN  ;SET SCREEN
        JMP NEWLVL  ;NEW LEVEL
NOTR5   LDA #0      ;# # OF SQUARES
        STA NUMSQ
        JSR SCREEN  ;SET SCREEN
        JMP READY   ;WE'RE READY!
NEWLVL  JSR CLINE22 ;CLEAR LINE 22
        LDX #4      ;NEW LEVEL MESSAGE
SHOLVL  LDA LVMSG,X
        STA DISP22+7,X
        DEX
        BPL SHOLVL
        LDA LEVEL   ;SHOW LEVEL #
        ORA #$10
        STA DISP22+13
        LDX #11     ;MAKE LEVEL SOUND
NLSND   LDA #150    ;SET SOUND,
        STA AUDF1
        LDA #168
        STA AUDC1
        LDA #28     ;SET COLORS
        STA DLI4C1+1
        LDA #136
        STA DLI4C2+1
        LDA #6      ;WAIT 6 JIFFIES
        JSR WAIT
        LDA #50     ;CHANGE SOUND
        STA AUDF1
        LDA #136    ;AND COLORS
        STA DLI4C1+1
        LDA #28
        STA DLI4C2+1
        LDA #6      ;WAIT AGAIN
        JSR WAIT
        DEX         ;MORE SOUNDS?
        BPL NLSND   ;YES!
        LDA #0      ;TURN OFF SOUND
        STA AUDC1
        JSR CLINE22 ;ERASE LINE 22
        LDA LEVEL   ;GET LEVEL #
        CMP #7      ;LEVEL 7?
        BNE NOT7    ;NO!
        LDA #6      ;MAKE IT 6 AGAIN
        STA LVL
NOT7    LDA #0      ;RESET PLAY FLAG
        STA BACK
        STA NUMSQ   ;AND # SQUARES
        JMP READY   ;GO PLAY!
CKDED2  CMP #2      ;HIT BY ROCK?
        BEQ DEAD2   ;YES!
        JMP CKDED3  ;NO, WE FELL.
DEAD2   DEC TOM     ;1 LESS LIFE
        LDX #15     ;DO DEATH SOUND
DEDSND  LDA #120    ;SET SOUND
        STA AUDF1
        TXA
        ORA #$10
        STA AUDC1
        LDA #5      ;WAIT 5 JIFFIES
        JSR WAIT
        DEX         ;NEXT SOUND
        BPL DEDSND
        JMP CHKEND  ;CHECK END OF GAME
CKDED3  DEC TOM     ;1 LESS LIFE
        LDA #1      ;RESET PRIORITY
        STA PRIOR
```

```
CHKEND  JSR BONLIF  ;BONUS LIFE CHECK
        LDA TOM     ;MORE LIVES?
        BNE NOTEND  ;YES!
        LDX #8      ;NO, SHOW END MESSAGE
SHOEND  LDA ENDMSG,X
        STA DISP3+5,X
        DEX
        BPL SHOEND
        JMP CKSTRG  ;GO CHECK RESTART
NOTEND  JSR SHOLIV  ;SHOW LIVES LEFT
        JMP READY   ;AND PLAY!
CLINE3  LDX #19     ;ERASE 3RD SCREEN LINE
        LDA #0
CL3LP   STA DISP3,X
        DEX
        BPL CL3LP
        RTS
CLINE22 LDX #39     ;ERASE LAST 2...
        LDA #0      ;SCREEN LINES
CL22LP  STA DISP22,X
        DEX
        BPL CL22LP
        RTS
WAIT    STA TIMER   ;SET TIMER
WAITLP  LDA TIMER   ;GET TIMER
        BNE WAITLP  ;NOT ZERO YET
        RTS         ;TIME'S UP!
SETCHR  LDX #0      ;COPY CHAR SET
MOVCHR  LDA $E000,X
        STA CHSET,X
        LDA $E100,X
        STA CHSET+$0100,X
        DEX
        BNE MOVCHR
        LDX #47     ;AND CHANGE...
CHGCHR  LDA NEWCHR,X ;THE CHARACTERS...
        STA CHSET+24,X ;WE'RE USING!
        DEX
        BPL CHGCHR
        LDA # >CHSET ;TURN ON...
        STA CHBASE  ;OUT CHAR SET
        LDA #62     ;TURN ON DMA
        STA DMACTL
        LDA # >DLIST ;POINT TO...
        STA DLISTH  ;OUR...
        LDA # <DLIST ;DISPLAY...
        STA DLISTL  ;LIST!
        LDA #3      ;TURN ON GRAPHICS
        STA GRACTL
        LDA # >PMAREA ;SET P/M AREA
        STA PMBASE
        LDA #38     ;SET COLORS
        STA COLPM0
        LDA #52
        STA COLPM1
        STA COLPM2
        STA COLPM3
        LDA #124    ;SET P/M POSITIONS
        STA HPOSP0
        LDA #116
        STA HPOSP1
        STA HPOSP2
        STA HPOSP3
        LDA #1      ;SET PRIORITY
        STA PRIOR
        LDA #15     ;SET MISC. COLORS
        STA COLPF0
        LDA #40
        STA COLPF1
        LDA #136
        STA COLPF2
        LDA #214
        STA COLPF3
        LDA # >DLI1 ;POINT TO DLI
        STA $0201
        LDA # <DLI1
        STA $0200
        LDX # >VBLANK ;SET VBLANK
        LDY # <VBLANK
        LDA #7
        JSR SETVBV
        LDA #0      ;CLEAR SCREEN
        TAX
CLSCRN  STA DISP,X
        STA DISP+240,X
        INX
        CPX #240
        BNE CLSCRN
        LDA #192    ;TURN ON DLI,
        STA NMIEN   ;VBLANK!
        RTS
VBLANK  LDA TIMER   ;GET TIMER
        BEQ NOTIM   ;IT'S ZERO!
        DEC TIMER   ;DECREMENT TIMER
NOTIM   JMP XITVBV  ;ALL DONE!
DLI1    PHA
        LDA #$44    ;SET COLPF0
        STA WSYNC
        STA $D016
        LDA # >DLI2 ;POINT TO DLI #2
        STA $0201
        LDA # <DLI2
        STA $0200
        PLA
        RTI
DLI2    PHA
DLI2C1  LDA #$58    ;SET COLPF1
        STA WSYNC
        STA $D017
        LDA # >DLI3 ;POINT TO DLI #3
        STA $0201
        LDA # <DLI3
        STA $0200
        PLA
        RTI
DLI3    PHA
        LDA $CB     ;TOGGLE...
        STA WSYNC   ;FLASHING...
        CMP #$28    ;ARROW...
        BNE DLI3B   ;COLORS
        LDA #0
        STA $CB
        LDA $CC
        BPL DLI3A
        LDA #0
        STA $CC
        BEQ DLI3B
DLI3A   LDA #$8E
        STA $CC
DLI3B   LDA $CC
        STA $D016   ;PF #
        INC $CB
        LDA # >DLI4 ;POINT TO DLI #4
        STA $0201
        LDA # <DLI4
        STA $0200
        PLA
        RTI
DLI4    PHA
DLI4C1  LDA #$0E    ;SET COLPF0
        STA WSYNC
        STA $D016
DLI4C2  LDA #$FC    ;COLPF1
        STA $D017
DLI4C3  LDA #$92    ;COLPF2
        STA $D018
DLI4C4  LDA #$42    ;COLPF3
        STA $D019
        LDA # >DLI1 ;POINT TO DLI #1
        STA $0201
        LDA # <DLI1
        STA $0200
        PLA
        RTI
SHOLIV  LDA #70     ;MAN CHAR
        STA DISP2
        LDA #93     ;EQUAL SIGN
        STA DISP2+1
        LDA TOM     ;SET # LIVES,
        SEC         ;PUT ON SCREEN
        SBC #1
        ORA #$10
        STA DISP2+2
        RTS
SCREEN  LDA # >[DISP+169] ;POINT TO...
        STA HI      ;PAD AREA...
        LDA # <[DISP+169] ;ON SCREEN
        STA LO
        LDA #1      ;AND SET UP PADS!
        STA PADCT
SETPAD  LDY PADCT
SPADLP  LDA PADATA,Y
        STA (LO),Y
        DEY
        BPL SPADLP
        LDA PADCT
        CLC
        ADC #2
        CMP #15
        BEQ PADEND
        STA PADCT
        LDA LO
        CLC
        ADC #39
        STA LO
        LDA HI
        ADC #0
        STA HI
        JMP SETPAD
PADEND  JSR STODIF
        LDA #0      ;ERASE...
        STA DISP+18 ;LEVEL #
        STA DISP+38 ;ROUND #
        LDX #5      ;SHOW LVL/RND MESSAGES
SETLR   LDA LVLMSG,X
        STA DISP+12,X
        LDA RNDMSG,X
        STA DISP1+12,X
        DEX
        BPL SETLR
        RTS
ZEROSC  LDX #5      ;ZERO SCORE
ZSCLP   LDA #16
        STA DISP,X
        LDA CHGMSG,X ;SET CHANGE TO MSG
        STA DISP4,X
        DEX
        BPL ZSCLP
        LDA #52     ;SET UP ARROWS...
        STA DISP5+2 ;AND COLOR INDICATOR
        LDA #47
        STA DISP5+3
        LDA #7
        STA DISP7+1
        LDA #67
        STA DISP7+2
        LDA #68
        STA DISP7+3
        LDA #8
        STA DISP7+4
        RTS
INILVL  LDA #1      ;START AT...
        STA LEVEL   ;LEVEL 1,
        STA LVL
        STA ROUND   ;ROUND 1
        LDA #4      ;4 LIVES!
        STA TOM
        LDA #0      ;SET START FLAG
        STA START
        LDA #2      ;SET MISC VARIABLES
        STA ROW
        LDA #96
        STA COLR
        LDA #16
        STA PNT
        RTS
SNDOFF  LDA #0      ;TURN OFF...
        STA AUDC1   ;SOUND CHANNEL 1
        STA AUDC2   ;SOUND CHANNEL 2
        STA AUDC3   ;SOUND CHANNEL 3
        STA AUDC4   ;SOUND CHANNEL 4
        RTS
SETLD   LDA LVL     ;GET LEVEL
        CMP #1      ;LEVEL 1?
        BEQ L14     ;YES!
        CMP #4      ;LEVEL 4?
        BNE CL25    ;NO! CHECK 2/5
L14     LDA DLI4C2+1 ;SET COLOR
        STA DLI2C1+1
        RTS
CL25    CMP #2      ;LEVEL 2?
        BEQ L25     ;YES!
        CMP #5      ;LEVEL 5?
        BNE L36     ;NO!
L25     LDA DLI4C3+1 ;SET COLOR
        STA DLI2C1+1
        RTS
L36     LDA DLI4C4+1 ;SET COLOR
        STA DLI2C1+1
        RTS
BONUS   LDX #20     ;PLAY MUSIC
MUSLP   LDA NOTE,X  ;SET NOTE
        STA AUDF1
        LDA #$AA
        STA AUDC1
        LDA DUR,X   ;SET DURATION
        JSR WAIT    ;WAIT
        JSR COLCYC  ;CYCLE COLORS
        DEX         ;MORE NOTES?
        BPL MUSLP   ;YES!
        LDX #60     ;DO DOWN-SLUR
MDOWN   STX AUDF1
        JSR COLCYC
        LDA #2
        JSR WAIT
        INX
        INX
        INX
        CPX #81
        BCC MDOWN
MUP     STX AUDF1   ;NOW UP-SLUR
        JSR COLCYC
        LDA #2
        JSR WAIT
        DEX
        DEX
        DEX
        CPX #57
        BNE MUP
        LDA #0      ;RESET BACKGND COLOR
        STA COLBK
        LDA #96
        STA COLR
        LDX #10     ;AND FADE OUT...
FADE    TXA         ;LAST NOTE
        ORA #$A0
        STA AUDC1
        LDA #4
        JSR WAIT
        DEX
        BPL FADE
        LDA #0      ;SHUT OFF SOUND
        STA AUDC1
        LDX #9      ;SHOW BONUS MESSAGE
SHOBMS  LDA BONMSG,X
        STA DISP22+5,X
        DEX
        BPL SHOBMS
```

```
        LDA SCORE+2 ;ADD 1000 POINTS
        CLC         ;TO SCORE
        ADC #1
        CMP #26
        BNE SHOSP2
        LDA SCORE+1
        CLC
        ADC #1
        CMP #26
        BNE SHOSP2
        LDA SCORE+1
        CLC
        ADC #1
        STA SCORE+1
        STA DISP+1
        LDA #16
SHOSP2  STA SCORE+2
        STA DISP+2
        LDA #200    ;WAIT 200 JIFFIES
        JSR WAIT
        RTS
BONLIF  LDA DISP+1  ;GET SCORE
        CMP PNT     ;> BONUS AMT?
        BEQ BRRET   ;NO!
        BCS BONUSL  ;YES!
BRRET   RTS
BONUSL  INC PNT     ;INC BONUS LEVEL
        INC TOM     ;1 MORE LIFE
        JSR SHOLIV  ;SHOW LIVES
        LDX #2      ;3 BONUS SOUNDS
        LDA #32     ;PITCH = 32
        STA AUDF1
BLS1    LDY #15     ;VOLUME 15
BLS2    TYA
        ORA #$A0
        STA AUDC1
        LDA #3      ;LEAVE ON 3 JIFFIES
        JSR WAIT
        DEY         ;NEXT VOLUME
        BPL BLS2
        DEX         ;NEXT SOUND
        BPL BLS1
        LDA #0      ;TURN OFF SOUND
        STA AUDC1
        RTS
STODIF  LDA OPT     ;GET DIFF FLAG
        STA OPTN1+1 ;STORE IN...
        STA OPTN2+1 ;PROGRAM
        LDA LEVEL   ;GET LEVEL
        CMP #3      ;LEVEL 3?
        BNE NOTL3   ;NO!
        LDA ROUND   ;GET ROUND
        CMP #1      ;ROUND 1?
        BEQ SET1    ;YES!
        CMP #3      ;ROUND 3?
        BNE NOTL3   ;NO!
SET1    LDA #0      ;SET DIFFICULTY
        STA OPTN2+1
DIFRTS  RTS
NOTL3   LDA LEVEL   ;GET LEVEL #
        CMP #7      ;LEVEL 7?
        BNE NOTL7   ;NO!
        LDA #0      ;SET DIFF
        STA OPTN1+1
        RTS
NOTL7   CMP #8      ;LEVEL 8?
        BEQ SET1    ;YES!
        CMP #9      ;LEVEL 9?
        BCC DIFRTS  ;NO!
        LDA #0      ;SET DIFF
        STA OPTN1+1
        BEQ SET1
COLCYC  LDA COLR    ;GET COLOR FLAG
        CLC         ;ADD 2
        ADC #2
        STA COLR    ;SAVE IT
        STA COLBK   ;AND SET BACKGND
        RTS

;-----------------
;START OF PROGRAM
;-----------------
;
GAME    JSR SETUP   ;INIT.....
        JSR FIG1

;---------
;MAIN LOOP
;---------
;
MAIN    LDA BACK    ;BACK TO
        CMP #$00
        BEQ CHKSTK  ;CONTROLLER?
        RTS         ;yes...
CHKSTK  LDA MOVFLG  ;ALREADY
        CMP #1      ;MOVIN...
        BNE A1      ;NO!
        JSR MOVE.MAN ;YES, MOVE MAN
        JMP A2
A1      LDA STICK0  ;CHK STICK
        STA DIRECT  ;SAVE STICK POS
        JSR MOVE.MAN ;MOVE MAN

A2      JSR ROCK2   ;HANDLE ROCK 2
        LDA TEMP    ;GET ADVANCE FLAG
OPTN1   CMP #1      ;0/1 SETS DIFFICULTY
        BNE A6      ;NO ADVANCE!
        LDA #0      ;RESET ADV FLAG
        STA TEMP
        JSR ROCK3   ;HANDLE ROCK 3
        JMP A5      ;SKIP NEXT CODE
A6      LDA #1      ;SET ADV FLAG
        STA TEMP
A5      LDA TEMP1   ;GET ADV FLAG 2
OPTN2   CMP #1      ;0/1 SETS DIFFICULTY
        BNE A3      ;NO ADVANCE!
        LDA #0      ;RESET ADV FLAG 2
        STA TEMP1
        JSR ROCK1   ;HANDLE ROCK 1
        JMP A4
A3      LDA #1      ;SET ADVANCE FLAG
        STA TEMP1
A4      JSR SOUND   ;DO SOUNDS
        JSR CHECK   ;CHECK SQUARES HIT
        JSR CLEAR   ;RESET P/M COLLISION
        JSR DELAY   ;DELAY...
        JSR PL.PL   ;CHECK PLR-PLR COLL.
        JMP MAIN    ;GO AGAIN

;
;--------------------
;MOVE MAN SUBROUTINE
;--------------------
;
MOVE.MAN LDA SO1FLG  ;CHK SOUND
        CMP #1      ;FLG
        BNE CHECKDIR
        RTS
;
CHECKDIR LDA DIRECT  ;GET STICK...
        CMP #9      ;DIRECTION
        BNE B1
        JMP DNLEFT0 ;DOWN & LEFT
B1      CMP #5
        BNE B2
        JMP DNRIGHT0 ;DOWN & RIGHT
B2      CMP #6
        BNE B3
        JMP UPRIGHT0 ;UP & RIGHT
B3      CMP #10
        BNE B4
        JMP UPLEFT0 ;UP & LEFT
B4      RTS
;
;----------
;ROCK1 SUB
;----------
ROCK1   LDA SO2FLG  ;SOUND ON?
        CMP #1
        BNE C1      ;NO!
        RTS
C1      LDA DRP1    ;DROPPING?
        CMP #80
        BEQ C11     ;NO!
        INC DRP1    ;NEXT DROP
        RTS
C11     LDA B1MOV   ;MOVING...
        CMP #1
        BNE C2
        JMP MOVE1   ;YES...
C2      LDA B1DRP   ;DROPED??
        CMP #1
        BEQ C3      ;YES...
        LDA RANDOM  ;NOT YET..
        BMI C4
        RTS         ;DONT DROP
C4      LDA #1      ;SET DRP..
        STA B1DRP
        JSR BAL1DRW ;DRAW ROCK
C3      LDA FNB1DRP ;FINISHED..
        CMP #1
        BNE DROP1   ;NO...
        JMP GETDIR1

;
DROP1   JSR DOWN1   ;DROP...
        JSR DOWN1
        JSR DOWN1
        JSR DOWN1
        LDA YPOSP1  ;FINISHED..
        CMP #109
        BCS D1      ;YES...
        RTS         ;NO....
D1      LDA #1
        STA FNB1DRP ;SET FLG..
        STA SO2FLG  ;SOUND FLG
        LDA #$AF
        STA PITCH2  ;PITCH...
        RTS         ;RETURN...

;
GETDIR1 LDA #1      ;GET DIRECT
        STA B1MOV
        LDA RANDOM
        BMI E1
        LDA #0      ;0=DNRIGHT
        STA B1DIR
        JMP MOVE1

E1      LDA #1      ;1=DNLEFT
        STA B1DIR
;
MOVE1   LDA B1DIR   ;WHICH WAY?
        CMP #1      ;DNLEFT??
        BNE F1      ;NO....
        JMP DNLEFT1 ;YES...
F1      JMP DNRIGHT1
;
;----------
;ROCK 2 SUB
;----------
ROCK2   LDA SO3FLG  ;SOUND ON?
        CMP #1
        BNE G1      ;NO!
        RTS
;
G1      LDA DRP2    ;DROPPING?
        CMP #40
        BEQ G11     ;NO!
        INC DRP2    ;INC DROP COUNT
        RTS
G11     LDA GRNFLG  ;GRN MAN
        CMP #1      ;OUT....
        BNE G2
        JMP GREEN   ;YES...
G2      LDA BAL1FLG ;ROCK OUT??
        CMP #1
        BNE G3
        JMP MOVBAL2 ;YES...
G3      LDA ROUND   ;CAN GREEN
        CMP #2      ;COME OUT??
        BNE G4      ;NO...
        JMP GRNCAN  ;YES...
G4      CMP #4
        BEQ GRNCAN
        JMP MOVBAL2 ;NO....
;
GRNCAN  LDA MAN
        CMP #50
        BEQ MOVBAL2
        LDA OUTFLG2 ;ROCK COME
        CMP #2      ;TWICE....
        BCC MOVBAL2
        LDA RANDOM  ;GREEN OR
        BMI MOVBAL2 ;ROCK....
        INC MAN     ;IT'S GREEN MAN!
        JMP GREEN
;
MOVBAL2 LDA B2MOV   ;MOVING...
        CMP #1
        BNE H2      ;NO...
        JMP MOVE2   ;YES...
H2      LDA B2DRP   ;DROPPED??
        CMP #1
        BEQ H3      ;YES...
        LDA RANDOM  ;NOT YET...
        BMI H4
        RTS
H4      LDA #1      ;SET DRP..
        STA B2DRP
        INC OUTFLG2
        JSR BAL2DRW ;DRAW ROCK
H3      LDA FNB2DRP ;FINISHED..
        CMP #1
        BNE DROP2   ;NO...
        JMP GETDIR2
;
DROP2   JSR DOWN2   ;ADVANCE...
        JSR DOWN2   ;FOUR...
        JSR DOWN2   ;TIMES
        JSR DOWN2
        LDA YPOSP2  ;DONE DROPPING?
        CMP #109
        BCS I1      ;YES!
        RTS
I1      LDA #1      ;FINISHED!
        STA FNB2DRP
        STA SO3FLG
        LDA #$AF    ;SET SOUND 3
        STA PITCH3
        RTS
;
GETDIR2 LDA #1      ;ROCK 2 MOVING
        STA B2MOV
        LDA RANDOM  ;GET RANDOM DIR
        BMI J1
        LDA #0      ;IT'S DOWN & RIGHT!
        STA B2DIR
        JMP MOVE2   ;GO MOVE IT!
J1      LDA #1      ;IT'S DOWN & LEFT!
        STA B2DIR
;
MOVE2   LDA B2DIR   ;WHICH DIR
        CMP #1      ;DN & LEFT?
        BNE K1      ;NO!
        JMP DNLEFT2
K1      JMP DNRIGHT2
;
GREEN   LDA #1      ;SET GRNFLG
        STA GRNFLG
```

```
        LDA #0
        STA OUTFLG2
        LDA GRNMOV   ;MOVING?
        CMP #1
        BNE L1       ;NO!
        JMP MOVEGRN  ;YES, MOVE IT!
L1      LDA GRNDRP   ;DROP YET?
        CMP #1
        BEQ L2       ;NO!
        LDA #1       ;SET FLG...
        STA GRNDRP   ;FOR DROP
        JSR GRN0     ;DRAW
L2      LDA GRNFNDRP ;DROP DONE?
        CMP #1
        BNE DROPGRN  ;NO!
        JMP GEDIRGRN ;YES, GET DIRECTION
DROPGRN JSR DOWN2    ;MOVE...
        JSR DOWN2    ;DOWN...
        JSR DOWN2    ;FOUR...
        JSR DOWN2    ;TIMES!
        LDA YPOSP2   ;DROP DONE?
        CMP #104
        BCS M1       ;YES!
        RTS
M1      LDA #1       ;SET DROP DONE FLAG
        STA GRNFNDRP
        STA SO3FLG
        LDA #$AF     ;AND SOUND!
        STA PITCH3
        RTS
;
GEDIRGRN LDA #1      ;SET GREEN MOVE FLAG
        STA GRNMOV
        INC GROW     ;INC GREEN ROW
        INC GROW
        LDA RANDOM   ;GET RANDOM COL MOVE
        BMI N1
        LDA #0       ;DOWN & RIGHT
        STA GRNDIR
        INC GCOL     ;INCREMENT COLUMN
        JSR GRN0     ;DRAW FACING RIGHT
        JMP MOVEGRN  ;AND MOVE HIM!
N1      LDA #1       ;DOWN & LEFT
        STA GRNDIR
        DEC GCOL     ;DEC COLUMN
        JSR GRN1     ;DRAW FACING LEFT
;
MOVEGRN LDA GRNDIR   ;GET DIRECTION
        CMP #1       ;DOWN & LEFT?
        BNE O1       ;NO!
        JMP DNLEFT2  ;MOVE IT!
O1      JMP DNRIGHT2 ;DITTO!
;
;----------
;ROCK 3 SUB
;----------
ROCK3   LDA SO4FLG   ;SOUND ON?
        CMP #1
        BNE P1       ;NO!
        RTS
P1      LDA GRGFLG   ;GEORGE ON?
        CMP #1
        BNE P2       ;NO!
        JMP GEORGE   ;HANDLE GEORGE
P2      LDA BAL2FLG  ;ROCK 2 OUT?
        CMP #1
        BNE P3       ;NO!
        JMP MOVBAL3  ;MOVE ROCK 3
P3      LDA ROUND    ;GET ROUND
        CMP #3       ;ROUND 3/4?
        BCS GRGCAN   ;YES, BRING OUT GEORGE!
        JMP MOVBAL3  ;MOVE ROCK 3!
;
GRGCAN  LDA OUTFLG   ;CAN GEORGE...
        CMP #2       ;COME OUT?
        BCC MOVBAL3  ;NO, DO ROCK 3
        LDA RANDOM   ;GET RANDOM CHANCE...
        BMI MOVBAL3  ;NO, HE CAN'T
        JMP GEORGE   ;COME ON, GEORGE!
;
MOVBAL3 LDA B3MOV    ;ROCK 3 MOVING?
        CMP #1
        BNE Q2       ;NO!
        JMP MOVE3    ;MOVE IT!
Q2      LDA B3DRP    ;ROCK 3 DROPPING?
        CMP #1
        BEQ Q3       ;YES!
        LDA RANDOM   ;READY TO DROP?
        BMI Q4       ;YES!
        RTS
Q4      LDA #1       ;SET DROP FLAG
        STA B3DRP
        STA BAL2FLG
        INC OUTFLG   ;INC GEORGE CHANCE
        JSR BAL3DRW  ;DRAW ROCK 3
Q3      LDA FNB3DRP  ;IS ROCK 3...
        CMP #1       ;DROP COMPLETE?
        BNE DROP3    ;NO!
        JMP GETDIR3  ;YES, GET DIRECTION
;
DROP3   JSR DOWN3    ;MOVE...
        JSR DOWN3    ;DOWN...
        JSR DOWN3    ;FOUR...
        JSR DOWN3    ;TIMES
        LDA YPOSP3   ;DROP DONE?
        CMP #109
        BCS R1       ;YES!
        RTS
R1      LDA #1       ;SET DROP...
        STA FNB3DRP  ;FINISH FLAG
        STA SO4FLG
        LDA #$AF     ;AND SOUND!
        STA PITCH4
        RTS
;
GETDIR3 LDA #1       ;SET ROCK 3 MOVE FLAG
        STA B3MOV
        LDA RANDOM   ;GET RANDOM CHANCE
        BMI S1
        LDA #0       ;DOWN & RIGHT!
        STA B3DIR
        JMP MOVE3    ;MOVE IT
S1      LDA #1       ;DOWN & LEFT!
        STA B3DIR
;
MOVE3   LDA B3DIR    ;GET ROCK 3 DIRECTION
        CMP #1       ;DOWN & LEFT?
        BNE T1       ;NO!
        JMP DNLEFT3  ;MOVE IT!
T1      JMP DNRIGHT3 ;DITTO!
;
GEORGE  LDA #1       ;SET...
        STA GRGFLG   ;GEORGE FLAG
        LDA GRGMOV   ;GEORGE MOVING?
        CMP #1
        BNE U1       ;NO!
        JMP MOVGRG   ;GO MOVE HIM!
U1      LDA GRGDRP   ;GEORGE DROPPING?
        CMP #1
        BEQ U2       ;YES!
        LDA #1       ;OK, START...
        STA GRGDRP   ;GEORGE DROP
        JSR GEORGE0  ;GEORGE FACING LEFT
U2      LDA FNGRDRP  ;GEORGE DROP DONE?
        CMP #1
        BNE DROPGRG  ;NO, DROP HIM!
        JMP GETDRGRG ;GET GEORGE DIRECTION
;
DROPGRG JSR DOWN3    ;MOVE GEORGE...
        JSR DOWN3    ;DOWN...
        JSR DOWN3    ;FOUR...
        JSR DOWN3    ;TIMES!
        LDA YPOSP3   ;DROP DONE?
        CMP #98
        BCS V1       ;YES!
        RTS
V1      LDA #1       ;SET GEORGE'S DROP...
        STA FNGRDRP  ;DONE FLAG
        STA SO4FLG
        LDA #$AF     ;SET SOUND
        STA PITCH4
        RTS
;
GETDRGRG LDA #1      ;SET GEORGE...
        STA GRGMOV   ;MOVING FLAG
        LDA PCOL     ;GET DIRECTION...
        CMP SCOL     ;BASED ON PLAYER POS.
        BCS RIGHT    ;GO RIGHT!
        LDA PROW     ;GET UP/DOWN
        CMP SROW
        BEQ W1       ;UP!
        BCC W1       ;UP!
        JSR GEORGE0  ;FACING LEFT & DOWN
        DEC SCOL     ;MOVE LEFT
        INC SROW     ;MOVE DOWN...
        INC SROW     ;2 TIMES
        LDA #0       ;0 = DOWN & LEFT
        STA GRDIR
        JMP MOVGRG   ;MOVE GEORGE!
W1      JSR GEORGE2  ;FACING LEFT & UP
        DEC SCOL     ;MOVE LEFT
        DEC SROW     ;MOVE UP...
        DEC SROW     ;2 TIMES
        LDA #2       ;2 = UP & LEFT
        STA GRDIR
        JMP MOVGRG   ;MOVE GEORGE!
RIGHT   LDA PROW     ;GET UP/DOWN
        CMP SROW
        BEQ X1       ;UP!
        BCC X1       ;UP!
        JSR GEORGE1  ;FACING RIGHT & DOWN
        INC SCOL     ;MOVE RIGHT
        INC SROW     ;MOVE DOWN...
        INC SROW     ;2 TIMES
        LDA #1       ;1 = RIGHT & DOWN
        STA GRDIR
        JMP MOVGRG   ;MOVE GEORGE!
X1      JSR GEORGE3  ;FACING RIGHT & UP
        INC SCOL     ;MOVE RIGHT
        DEC SROW     ;MOVE UP...
        DEC SROW     ;2 TIMES
        LDA #3       ;3 = RIGHT & UP
        STA GRDIR
;
MOVGRG  LDA GRDIR    ;GET GEORGE DIRECTION
        CMP #0       ;DOWN & LEFT?
        BNE Y1       ;NO!
        JMP DNLEFT3
Y1      CMP #1       ;DOWN & RIGHT?
        BNE Y2       ;NO!
        JMP DNRIGHT3
Y2      CMP #2       ;UP & LEFT?
        BNE Y3       ;NO!
        JMP UPLEFT3
Y3      JMP UPRIGHT3
;
;----------------
;SOUND SUBROUTINE
;----------------
;
SOUND   LDA SO1FLG   ;SOUND 1 ON?
        CMP #1
        BEQ Z1       ;YES!
        JMP SO2      ;NO, DO SOUND 2
Z1      LDA PITCH1   ;GET SOUND 1 PITCH
        STA AUDC1
        DEC PITCH1   ;NEXT PITCH
        LDA PITCH1   ;GET PITCH
        CMP #$A0     ;ALL DONE?
        BEQ Z2       ;YES!
        JMP SO2
Z2      LDA #0       ;TURN OFF...
        STA AUDC1    ;SOUND 1,
        STA SO1FLG   ;SOUND 1 FLAG,
        STA MOVFLG   ;MOVEMENT FLAG
        LDA #8
        STA COUNT1
        LDA P0PF     ;MAN ON SQUARE?
        CMP #0
        BNE GETLEVEL ;YES!
        JSR FALL     ;UH-OH, HE FELL!
        RTS          ;HE'S OK
;
GETLEVEL JSR UPDATMAN ;MOVE MAN
        LDA LEVEL    ;GO TO...
        CMP #1       ;APPROPRIATE...
        BNE AA1      ;LEVEL HANDLER!
        JMP LEVEL1
AA1     CMP #2
        BNE AA2
        JMP LEVEL2
AA2     CMP #3
        BNE AA4
        JMP LEVEL3
AA4     CMP #4
        BNE AA5
        JMP LEVEL4
AA5     CMP #5
        BNE AA6
        JMP LEVEL5
AA6     CMP #6
        BNE AA7
        JMP LEVEL6
AA7     CMP #7
        BNE AA8
        JMP LEVEL3
AA8     JMP LEVEL6
;
LEVEL1  LDA P0PF     ;HIT
        CMP #1       ;PLAYFIELD 0?
        BNE BB1      ;NO...
        INC NUMSQ    ;YES-INCREMENT SQUARES
        JSR PLAYFLD1 ;CHANGE IT TO PF1
BB1     JMP SO2
;
LEVEL2  LDA P0PF     ;HIT
        CMP #1       ;PLAYFIELD 0?
        BNE CC1      ;NO...
        JSR PLAYFLD1 ;CHANGE IT TO PF1
        JMP SO2      ;AND PROCEED
CC1     CMP #2       ;PLAYFIELD 1?
        BNE CC2      ;NO...
        INC NUMSQ    ;1 MORE SQUARE
        JSR PLAYFLD2 ;CHANGE IT TO PF2!
CC2     JMP SO2      ;AND PROCEED
;
LEVEL4  LDA P0PF     ;HIT PLAYFIELD 0?
        CMP #1
        BNE DD1      ;NO...
        INC NUMSQ    ;1 MORE SQUARE!
        JSR PLAYFLD1 ;CHANGE TO PF1
        JMP SO2      ;PROCEED!
DD1     DEC NUMSQ    ;DEDUCT SQUARE!
        JSR PLAYFLD0 ;BACK TO PF0
        JMP SO2      ;AND GO ON.
;
LEVEL3  LDA P0PF     ;HIT PLAYFIELD 0?
        CMP #1
        BNE EE1      ;NO...
        JSR PLAYFLD1 ;CHANGE TO PF1
        JMP SO2      ;AND PROCEED
EE1     CMP #2       ;HIT PLAYFIELD 2?
        BNE EE2      ;NO...
        JSR PLAYFLD2 ;CHANGE TO PF2
        JMP SO2      ;AND PROCEED
EE2     CMP #4       ;HIT PLAYFIELD 2?
        BNE SO2      ;NO...
```

```
        INC NUMSQ   ;1 MORE SQUARE
        JSR PLAYFLD3 ;CHANGE TO PF3
        JMP SO2     ;AND PROCEED
;
LEVEL5  LDA P0PF    ;HIT PLAYFIELD 0?
        CMP #1
        BNE FF1     ;NO...
        JSR PLAYFLD1 ;CHANGE TO PF1
        JMP SO2     ;PROCEED
FF1     CMP #2      ;HIT PLAYFIELD 1?
        BNE FF2     ;NO...
        INC NUMSQ   ;1 MORE SQUARE
        JSR PLAYFLD2 ;CHANGE TO PF2
        JMP SO2     ;PROCEED
FF2     DEC NUMSQ   ;1 LESS SQUARE
        JSR PLAYFLD1 ;CHANGE TO PF1
        JMP SO2     ;PROCEED
;
LEVEL6  LDA P0PF    ;HIT PLAYFIELD 0?
        CMP #1
        BNE GG1     ;NO...
        JSR PLAYFLD1 ;CHANGE TO PF1
        JMP SO2     ;PROCEED
GG1     CMP #2      ;HIT PLAYFIELD 1?
        BNE GG2     ;NO...
        JSR PLAYFLD2 ;CHANGE TO PF2
        JMP SO2     ;PROCEED
GG2     CMP #4      ;HIT PLAYFIELD 2?
        BNE GG3     ;NO...
        INC NUMSQ   ;1 MORE SQUARE
        JSR PLAYFLD3 ;CHANGE TO PF3
        JMP SO2     ;PROCEED
GG3     DEC NUMSQ   ;1 LESS SQUARE
        JSR PLAYFLD2 ;CHANGE TO PF2
;
SO2     LDX #0      ;ROCK 1
        LDY #0
        JSR BALCHK  ;SEE IF IT FELL
        LDA FALOFF  ;DID IT FALL?
        CMP #1
        BEQ HH1     ;YES!
        JMP SO3     ;NO, PROCEED
HH1     LDY YPOSP1  ;ERASE ROCK 1
        LDX #0
        TXA
HH2     STA PLAY1,Y
        INX
        INY
        CPX #10
        BNE HH2
        LDA #0      ;RESET DROP FLAG
        STA DRP1
        LDX #0      ;CLR OTHER FLAGS
        JSR CLRFL8
;
SO3     LDA GRNFL8  ;GREEN MAN ACTIVE?
        CMP #1
        BNE II99    ;NO!
        JMP GRNCHK  ;SEE IF HE FELL
II99    LDX #1      ;ROCK 2
        LDY #2
        JSR BALCHK  ;SEE IF IT FELL
        LDA FALOFF  ;DID ROCK 2 FALL?
        CMP #1
        BEQ II1     ;YES!
        JMP SO4     ;NO, PROCEED
II1     LDY YPOSP2  ;ERASE ROCK 2
        LDX #0
        TXA
II2     STA PLAY2,Y
        INX
        INY
        CPX #10
        BNE II2
        LDA #0      ;RESET DROP FLAG
        STA DRP2
        STA BAL1FL8
        LDX #1      ;AND OTHER FLAGS
        JSR CLRFL8
;
SO4     LDA GR8FL8  ;GEORGE ACTIVE?
        CMP #1
        BEQ GR8CHK  ;YES!
        LDX #2      ;CHECK ROCK 3
        LDY #4
        JSR BALCHK  ;SEE IF IT FELL
        LDA FALOFF  ;DID IT FALL?
        CMP #1
        BEQ JJ1     ;YES!
        RTS
JJ1     LDY YPOSP3  ;ERASE ROCK 3
        LDX #0
        TXA
JJ2     STA PLAY3,Y
        INY
        INX
        CPX #10
        BNE JJ2
        LDA #0      ;CLEAR ROCK 3 FLAG
        STA BAL2FL8
        LDX #2      ;AND OTHER FLAGS
        JSR CLRFL8
        RTS
;
GR8CHK  LDA SO4FL8  ;SOUND ON?
        CMP #1
        BEQ KK1     ;YES!
        RTS
KK1     LDA PITCH4  ;SET VOLUME
        STA AUDC4
        DEC PITCH4  ;NEXT VOLUME
        LDA PITCH4  ;SOUND DONE?
        CMP #$A0
        BEQ KK2     ;YES!
        RTS
KK2     LDA P3PF    ;DID GEORGE...
        CMP #0      ;HIT PF?
        BNE KK3     ;YES!
        LDA #5      ;ADD 500 POINTS...
        STA SUM     ;TO SCORE
        JSR ADD2##
        JSR RESET   ;RESET GEORGE
        RTS
KK3     LDA #0      ;ZERO...
        STA AUDC4   ;SOUND 4,
        STA SO4FL8  ;SOUND 4 FLAG
        STA GR8MOV  ;GEORGE MOVE FLAG
        LDA #8
        STA COUNT4
        RTS
;
GRNCHK  LDA SO3FL8  ;SOUND 3 ON?
        CMP #1
        BEQ LL1     ;YES!
        JMP SO4     ;NO, DO SOUND 4
LL1     LDA PITCH3  ;SET SOUND 3 VOLUME
        STA AUDC3
        DEC PITCH3  ;NEXT VOLUME
        LDA PITCH3  ;SOUND 3 DONE?
        CMP #$A0
        BEQ LL2     ;YES!
        JMP SO4     ;NO, DO SOUND 4
LL2     LDA #0      ;TURN OFF SOUND 3
        STA AUDC3
        LDA P2PF    ;DID GREEN MAN...
        CMP #0      ;HIT PLAYFIELD?
        BNE GOBACK  ;YES!
HITGRN  JSR ERASEGRN ;GREEN MAN GONE
        LDA #0      ;RESET GREEN MAN
        STA GRNDRP
        STA GRNFNDRP
        STA GRNFL8
        STA GRNMOV
        STA SO3FL8
        STA DRP2
        LDA #10     ;RESET ROW
        STA GROW
        LDA #8      ;RESET COLUMN
        STA GCOL
        STA COUNT3
        LDA #45
        STA YPOSP2
        LDA #116
        STA HPOSP2
        STA XPOSP2
        RTS
GOBACK  LDA #0      ;RESET SOUND 3
        STA SO3FL8
        STA GRNMOV
        LDA #8
        STA COUNT3
        LDA P2PF    ;DID GREEN HIT PF#?
        CMP #1
        BNE MM4     ;NO!
        RTS
MM4     JSR DECNUM  ;DEC # SQUARES
        LDA # <PF#  ;CHANGE TO PF#
        STA FILE
        LDA # >PF#
        STA FILE+1
        LDA GCOL    ;SET COLUMN
        STA COL
        LDA GROW    ;AND ROW
        STA ROW
        JSR CHANGE  ;CHANGE IT!
        RTS
DECNUM  LDA LEVEL   ;GET LEVEL
        CMP #1
        BEQ NN1     ;LEVEL 1
        CMP #2
        BEQ NN2     ;LEVEL 2
        CMP #3
        BEQ NN4     ;LEVEL 3
        CMP #4
        BEQ NN1     ;LEVEL 4
        CMP #5
        BEQ NN2     ;LEVEL 5
        JMP NN4     ;LEVEL 6
;
NN1     LDA P2PF    ;HIT PF1?
        CMP #2
        BEQ DECR    ;YES!
        RTS
NN2     LDA P2PF    ;HIT PF2?
        CMP #4
        BEQ DECR    ;YES!
        RTS
NN4     LDA P2PF    ;HIT PF3?
        CMP #8
        BEQ DECR    ;YES!
        RTS
DECR    DEC NUMSQ   ;1 LESS SQUARE
        RTS
BALCHK  LDA SO2FL8,X ;SOUND 2 ON?
        CMP #1
        BEQ OO1     ;YES!
        RTS
OO1     LDA PITCH2,X ;SET VOLUME
        STA AUDC2,Y
        DEC PITCH2,X ;NEXT VOLUME
        LDA PITCH2,X ;ALL DONE?
        CMP #$A0
        BEQ OO2     ;YES!
        RTS
OO2     LDA #0      ;TURN OFF...
        STA AUDC2,Y ;SOUND 2
        LDA P1PF,X  ;DID ROCK...
        CMP #0      ;HIT PF?
        BNE OO3     ;YES!
        LDA #1      ;UH-OH!  IT FELL!
        STA FALOFF  ;SET FALL FLAG
        RTS
OO3     LDA #0      ;RESET SOUND FLAG
        STA SO2FL8,X
        STA B1MOV,X
        LDA #8
        STA COUNT2,X
        RTS
;
CLRFL8  LDA #$00    ;RESET MISC FLAGS
        STA B1MOV,X
        STA SO2FL8,X
        STA B1DRP,X
        STA FNB1DRP,X
        STA FALOFF
        LDA #8
        STA COUNT2,X
        LDA #45
        STA YPOSP1,X
        LDA HPOS,X
        STA HPOSP1,X
        STA XPOSP1,X
        RTS
;
UPDATMAN LDA DIRECT  ;GET DIR...
        CMP #9
        BEQ PP1     ;DOWN & LEFT
        CMP #5
        BEQ PP2     ;DOWN & RIGHT
        CMP #6
        BEQ PP4     ;UP & RIGHT
        CMP #10
        BEQ PP3     ;UP & LEFT
        RTS
;
PP1     DEC PCOL    ;MOVE LEFT
        INC PROW    ;MOVE DOWN...
        INC PROW    ;2 TIMES
        RTS
PP2     INC PCOL    ;MOVE RIGHT
        INC PROW    ;MOVE DOWN...
        INC PROW    ;2 TIMES
        RTS
PP3     DEC PCOL    ;MOVE LEFT
        DEC PROW    ;MOVE UP...
        DEC PROW    ;2 TIMES
        RTS
PP4     INC PCOL    ;MOVE RIGHT
        DEC PROW    ;MOVE UP...
        DEC PROW    ;2 TIMES
        RTS
;
PCUBPOS LDA PCOL    ;SAVE SQUARE POS.
        STA COL
        LDA PROW
        STA ROW
        RTS
;
;-----
;DELAY
;-----
DELAY   LDX #$FF    ;TIME DELAY
QQ1     LDY TIME
QQ2     DEY
        BNE QQ2
        DEX
        BNE QQ1
        RTS
;
;-------------
;SETUP ROUTINE
;-------------
;
SETUP   LDA START   ;INIT ALL?
        CMP #$00
        BNE PART    ;NO...
```

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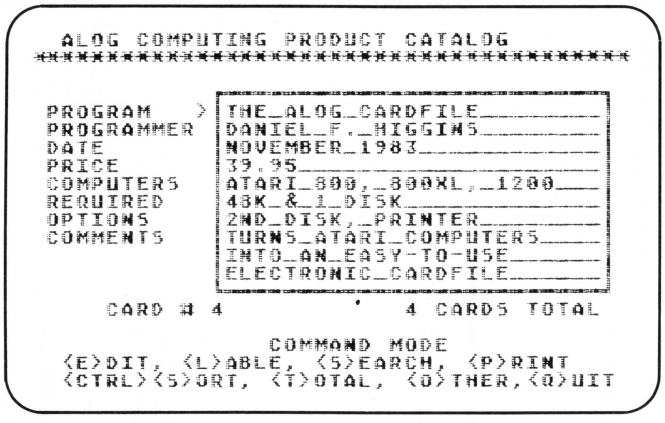

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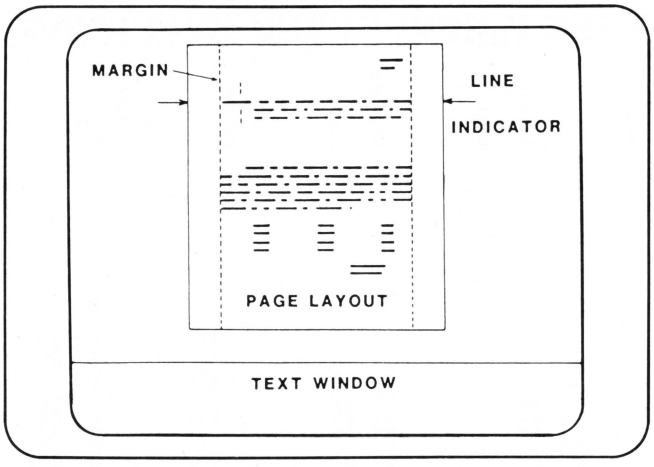

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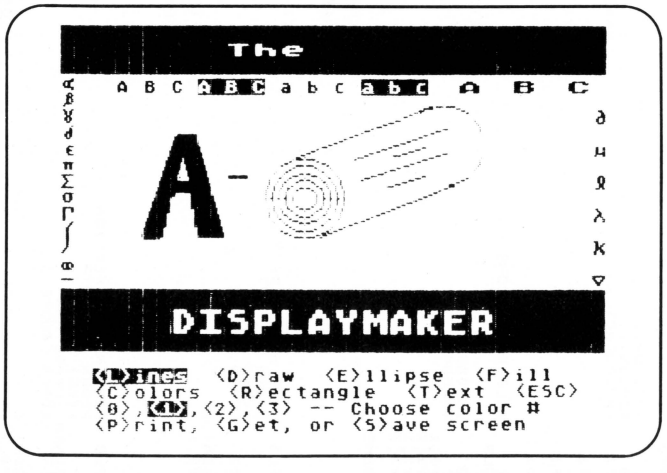

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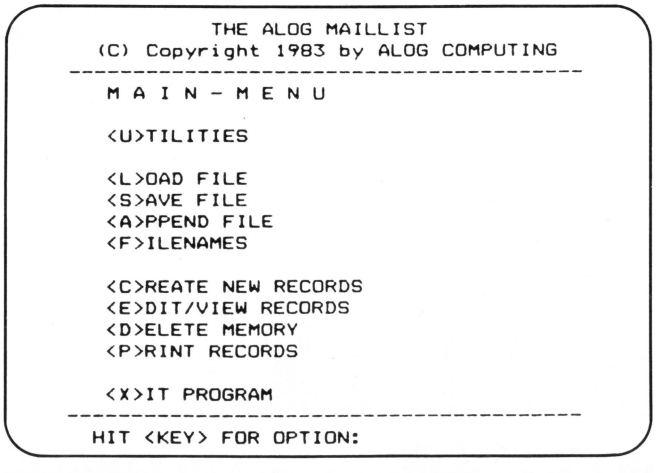

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CIRCLE #124 ON READER SERVICE CARD

```
        LDA #$00    ;YES...
        STA NUMSQ
        LDA #$10    ;RESET
        LDX #0      ;SCORE...
RESET1  STA SCORE,X
        INX
        CPX #$06
        BNE RESET1
;
PART    LDA #$00    ;SET FLG'S
        LDX #0      ;TO ZERO..
SETZERO STA BACK,X
        INX
        CPX #100
        BNE SETZERO
        LDA #$08    ;SET COUNT
        STA COUNT1
        STA COUNT2
        STA COUNT3
        STA COUNT4
;
        LDA #9      ;SET PLAYER
        STA PCOL    ;COLUMN &
        LDA #8      ;ROW...
        STA PROW
;
        LDA #10     ;SET GEORGE
        STA SCOL    ;&GREEN
        STA SROW    ;COLUMN...
        STA GROW
        LDA #8
        STA GCOL
;
        LDA #124    ;PM DATA..
        STA PXPOS
        STA HPOSP0
        LDA #85
        STA PYPOS
        LDA #116
        STA XPOSP1
        STA XPOSP2
        STA HPOSP1
        STA HPOSP2
        STA HPOS
        STA HPOS+1
        LDA #132
        STA XPOSP3
        STA HPOS+2
        STA HPOSP3
        LDA #45
        STA YPOSP1
        STA YPOSP2
        STA YPOSP3
;
        CLC         ;SET UP...
        LDA #170    ;SOUND...
        STA AUDF1   ;FREQUENCIES
        ADC #10
        STA AUDF2
        ADC #10
        STA AUDF3
        ADC #10
        STA AUDF4
;
        LDA #$01    ;CLR COLLISIONS
        STA HITCLR
;
PMCLR   LDA #$00    ;ERASE P/M
        LDX #$FF    ;MEMORY
ERASEMEM STA PLAY0,X
        STA PLAY1,X
        STA PLAY2,X
        STA PLAY3,X
        DEX
        BNE ERASEMEM
        RTS         ;RETURN...
;
;---------------
;FIGURES FOR MAN
;---------------
;
FIG1    LDA DIRFLG  ;GET MOVE DIRECTION
        CMP #9      ;DOWN & LEFT?
        BEQ RR2     ;YES!
        LDY PYPOS   ;DRAW FIGURE 1
        LDX #0
RR1     LDA FIG1DAT,X
        STA PLAY0,Y
        INY
        INX
        CPX #16
        BNE RR1
RR2     RTS
;
FIG2    LDA DIRFLG  ;GET MOVE DIRECTION
        CMP #5      ;DOWN & RIGHT?
        BEQ SS2     ;YES!
        JSR ERASEMAN ;ERASE MAN
        LDY PYPOS   ;DRAW FIGURE 2
        LDX #0
SS1     LDA FIG2DAT,X
        STA PLAY0,Y
        INY
        INX
        CPX #16
        BNE SS1
SS2     RTS
;
FIG3    LDA DIRFLG  ;GET DIRECTION
        CMP #10     ;UP & LEFT?
        BEQ TT2     ;YES!
        JSR ERASEMAN ;ERASE MAN
        LDY PYPOS   ;DRAW FIGURE 3
        LDX #0
TT1     LDA FIG3DAT,X
        STA PLAY0,Y
        INY
        INX
        CPX #15
        BNE TT1
TT2     RTS
;
FIG4    LDA DIRFLG  ;GET DIRECTION
        CMP #6      ;UP & RIGHT?
        BEQ UU2     ;YES!
        JSR ERASEMAN ;ERASE MAN
        LDY PYPOS   ;DRAW FIGURE 4
        LDX #0
UU1     LDA FIG4DAT,X
        STA PLAY0,Y
        INY
        INX
        CPX #15
        BNE UU1
UU2     RTS
GRN0    JSR ERASEGRN ;ERASE GREEN MAN
        LDY YPOSP2  ;DRAW GREEN MAN...
        LDX #$00    ;FACING RIGHT
VV1     LDA GRN1DAT,X
        STA PLAY2,Y
        INX
        INY
        CPX #13
        BNE VV1
        JSR SETGRN  ;SET GREEN PARAMETERS
        RTS
;
GRN1    JSR ERASEGRN ;ERASE GREEN MAN
        LDY YPOSP2  ;DRAW GREEN MAN...
        LDX #0      ;FACING LEFT
WW1     LDA GRN2DAT,X
        STA PLAY2,Y
        INY
        INX
        CPX #13
        BNE WW1
        JSR SETGRN  ;SET GREEN PARAMETERS
        RTS
;
ERASEGRN LDY YPOSP2  ;ERASE GREEN MAN
        LDX #0
        TXA
XX1     STA PLAY2,Y
        INX
        INY
        CPX #15
        BNE XX1
        RTS
;
SETGRN  LDA #13     ;GREEN 13 LINES TALL
        STA LENGTH
        LDA #11
        STA ADDNUM
        LDA #198    ;AND HE'S GREEN!
        STA PCOLR2
        RTS
;
;
;ERASE MAN SUB
;
ERASEMAN LDY PYPOS
        LDX #$00
        LDA #$00
YY1     STA PLAY0,Y
        INY
        INX
        CPX #20
        BNE YY1
        RTS
;
;FIGURES FOR GEORGE !!
;
GEORGE0  JSR ERASEGRG ;ERASE GEORGE
        LDY YPOSP3  ;DRAW GEORGE...
        LDX #0      ;IN POSISION 0
ZZ1     LDA GRG0DAT,X
        STA PLAY3,Y
        INY
        INX
        CPX #18
        BNE ZZ1
        JSR SETGRG  ;SET GEORGE PARAMETERS
        RTS
;
GEORGE1  JSR ERASEGRG ;ERASE GEORGE
        LDY YPOSP3  ;DRAW GEORGE...
        LDX #0      ;IN POSITION 1
AAA1    LDA GRG1DAT,X
        STA PLAY3,Y
        INY
        INX
        CPX #18
        BNE AAA1
        RTS
;
GEORGE2  JSR ERASEGRG ;ERASE GEORGE
        LDY YPOSP3  ;DRAW GEORGE...
        LDX #0      ;IN POSITION 2
BBB1    LDA GRG2DAT,X
        STA PLAY3,Y
        INY
        INX
        CPX #18
        BNE BBB1
        RTS
;
GEORGE3  JSR ERASEGRG ;ERASE GEORGE
        LDY YPOSP3  ;DRAW GEORGE...
        LDX #0      ;IN POSITION 3
CCC1    LDA GRG3DAT,X
        STA PLAY3,Y
        INY
        INX
        CPX #18
        BNE CCC1
        RTS
;
SETGRG  LDA #19     ;GEORGE 19 LINES TALL
        STA LENGTH3
        LDA #16
        STA ADDNUM3
        LDA #86     ;GEORGE PURPLE!
        STA PCOLR3
        RTS
;
ERASEGRG LDY YPOSP3  ;ERASE GEORGE
        LDX #0
        TXA
DDD1    STA PLAY3,Y
        INY
        INX
        CPX #20
        BNE DDD1
        RTS
;
;-----------------
;CHANGE SQUARE SUB
;-----------------
;
CHANGE  LDA ROW     ;GET ROW,
        STA LO      ;SAVE IN...
        LDA #0      ;MULT AREA
        STA HI
        ASL LO      ;*2
        ASL LO      ;*4
        LDA LO      ;SAVE *4 VALUE
        STA TIMES4
        ASL LO      ;*8
        ASL LO      ;*16
        ROL HI
        LDA LO      ;**4 = *20
        CLC
        ADC TIMES4
        STA LO
        LDA HI
        ADC #0
        STA HI
        LDA LO      ;NOW ADD COLUMN
        CLC
        ADC COL
        STA LO
        LDA HI
        ADC #0
        STA HI
        LDA LO      ;NOW DISPLAY START
        CLC
        ADC # <DISP
        STA LO
        LDA HI
        ADC # >DISP
        STA HI
        LDY #1
        LDA (FILE),Y ;GET RIGHT OF SQUARE
        STA (LO),Y  ;PUT ON SCREEN
        DEY
        LDA (FILE),Y ;GET LEFT OF SQUARE
        STA (LO),Y  ;PUT ON SCREEN
        RTS         ;ALL DONE!
;
;-------------
;FALL OFF SUB
;-------------
FALL    LDA #$04    ;SET PRIOR
        STA PRIOR
        LDA #2
        STA TIME
        JSR TURNOFF
        LDA #$AA
```

```
          STA AUDC1
EEE1      LDA PYPOS    ;GET YPOS
          STA AUDF1    ;MAKE SO...
          CMP #240     ;OFF SCR...
          BEQ ENDLP    ;YES...
          JSR DOWN0    ;NO...
          JSR DELAY    ;DELAY...
          JMP EEE1     ;DO AGAIN
ENDLP     LDA #$6F
          STA AUDC1
          CLC
          LDA #130
FFF1      STA AUDF1
          ADC #1
          JSR DELAY
          CMP #210
          BNE FFF1
          LDA #$00
          STA AUDF1
          STA AUDC1
          LDA #3       ;3=FALL
          STA BACK
          RTS
;---------
;DRAW ROCK
;---------
BAL1DRW   LDY YPOSP1   ;DRAW ROCK 1
          LDX #$00
GGG1      LDA BALDAT,X
          STA PLAY1,Y
          INY
          INX
          CPX #10
          BNE GGG1
          RTS
;
BAL2DRW   LDY YPOSP2   ;DRAW ROCK 2
          LDX #0
HHH1      LDA BALDAT,X
          STA PLAY2,Y
          INX
          INY
          CPX #10
          BNE HHH1
          LDA #10      ;SET ROCK PARAMS
          STA LENGTH   ;(INSTEAD OF...
          LDA #8       ;GREEN MAN)
          STA ADDNUM
          LDA #52
          STA PCOLR2
          RTS
;
BAL3DRW   LDY YPOSP3   ;DRAW ROCK 3
          LDX #0
III1      LDA BALDAT,X
          STA PLAY3,Y
          INY
          INX
          CPX #10
          BNE III1
          LDA #10      ;SET ROCK PARAMS
          STA LENGTH3  ;(INSTEAD OF...
          LDA #8       ;GEORGE!)
          STA ADDNUM3
          LDA #52
          STA PCOLR3
          RTS
;
;-------------
;MOVEMENT SUBS
;-------------
;
DNLEFT0   JSR FIG1     ;SHAPE...
          LDA #1
          STA MOVFLG
          JSR LEFT0    ;MOVE...
          JSR DOWN0
          JSR DOWN0
          DEC COUNT1
          BNE JJJ1
          JSR SETFLG0  ;RETURN
JJJ1      RTS
;
DNRIGHT0  JSR FIG2     ;SHAPE...
          LDA #1
          STA MOVFLG
          JSR RIGHT0   ;MOVE...
          JSR DOWN0
          JSR DOWN0
          DEC COUNT1   ;DONE...
          BNE KKK1
          JSR SETFLG0  ;RETURN
KKK1      RTS
;
UPLEFT0   JSR FIG3     ;SHAPE...
          LDA #1
          STA MOVFLG
          JSR LEFT0    ;MOVE...
          JSR UP0
          JSR UP0
          DEC COUNT1   ;DONE???
          BNE LLL1
          JSR SETFLG0  ;SETFLG...
LLL1      RTS
;
UPRIGHT0  JSR FIG4     ;SHAPE...
          LDA #1
          STA MOVFLG
          JSR RIGHT0   ;MOVE...
          JSR UP0
          JSR UP0
          DEC COUNT1   ;DONE???
          BNE MMM1
          JSR SETFLG0
MMM1      RTS
;
LEFT0     DEC PXPOS    ;MOVE MAN LEFT
          LDA PXPOS
          STA HPOSP0
          RTS
;
RIGHT0    INC PXPOS    ;MOVE MAN RIGHT
          LDA PXPOS
          STA HPOSP0
          RTS
;
UP0       LDY PYPOS    ;MOVE MAN UP
          LDX #$00
NNN1      LDA PLAY0,Y
          STA PLAY0-1,Y
          INX
          INY
          CPX #17
          BNE NNN1
          DEC PYPOS
          RTS
;
DOWN0     LDX #0       ;MOVE MAN DOWN
          CLC
          LDA PYPOS
          ADC #14
          TAY
OOO1      LDA PLAY0,Y
          STA PLAY0+1,Y
          DEY
          INX
          CPX #17
          BNE OOO1
          INC PYPOS
          RTS
;
;ROCK 1 MOVEMENT
;
DNLEFT1   JSR LEFT1    ;MOVE LEFT,
          JSR DOWN1    ;MOVE DOWN...
          JSR DOWN1    ;2 TIMES
          DEC COUNT2
          BNE PPP1
          LDX #0
          JSR SETFLG   ;SET UP SOUND
PPP1      RTS
;
DNRIGHT1  JSR RIGHT1   ;MOVE RIGHT,
          JSR DOWN1    ;MOVE DOWN...
          JSR DOWN1    ;2 TIMES
          DEC COUNT2
          BNE QQQ1
          LDX #0
          JSR SETFLG   ;SET UP SOUND
QQQ1      RTS
;
LEFT1     DEC XPOSP1   ;MOVE ROCK 1 LEFT
          LDA XPOSP1
          STA HPOSP1
          RTS
;
RIGHT1    INC XPOSP1   ;MOVE ROCK 1 RIGHT
          LDA XPOSP1
          STA HPOSP1
          RTS
;
DOWN1     LDX #0       ;MOVE PLAYER 1 DOWN
          CLC
          LDA YPOSP1
          ADC #8
          TAY
RRR1      LDA PLAY1,Y
          STA PLAY1+1,Y
          DEY
          INX
          CPX #10
          BNE RRR1
          INC YPOSP1
          RTS
;
;ROCK 2 MOVEMENT
;
;SAME AS ROCK 1, BUT FOR ROCK 2
;
DNLEFT2   JSR LEFT2
          JSR DOWN2
          JSR DOWN2
          DEC COUNT3
          BNE SSS1
          LDX #1
          JSR SETFLG
SSS1      RTS
;
DNRIGHT2  JSR RIGHT2
          JSR DOWN2
          JSR DOWN2
          DEC COUNT3
          BNE TTT1
          LDX #1
          JSR SETFLG
TTT1      RTS
;
LEFT2     DEC XPOSP2
          LDA XPOSP2
          STA HPOSP2
          RTS
;
RIGHT2    INC XPOSP2
          LDA XPOSP2
          STA HPOSP2
          RTS
;
DOWN2     LDX #0
          CLC
          LDA YPOSP2
          ADC ADDNUM
          TAY
UUU1      LDA PLAY2,Y
          STA PLAY2+1,Y
          DEY
          INX
          CPX LENGTH
          BNE UUU1
          INC YPOSP2
          RTS
;
;ROCK 3 MOVEMENT
;
;SAME AS ROCK 1, BUT FOR ROCK 3
;
DNLEFT3   JSR LEFT3
          JSR DOWN3
          JSR DOWN3
          DEC COUNT4
          BNE VVV1
          LDX #2
          JSR SETFLG
VVV1      RTS
;
DNRIGHT3  JSR RIGHT3
          JSR DOWN3
          JSR DOWN3
          DEC COUNT4
          BNE WWW1
          LDX #2
          JSR SETFLG
WWW1      RTS
;
UPLEFT3   JSR LEFT3
          JSR UP3
          JSR UP3
          DEC COUNT4
          BNE XXX1
          LDX #2
          JSR SETFLG
XXX1      RTS
;
UPRIGHT3  JSR RIGHT3
          JSR UP3
          JSR UP3
          DEC COUNT4
          BNE YYY1
          LDX #2
          JSR SETFLG
YYY1      RTS
;
LEFT3     DEC XPOSP3
          LDA XPOSP3
          STA HPOSP3
          RTS
;
RIGHT3    INC XPOSP3
          LDA XPOSP3
          STA HPOSP3
          RTS
;
UP3       LDY YPOSP3
          LDX #0
ZZZ1      LDA PLAY3,Y
          STA PLAY3-1,Y
          INY
          INX
          CPX LENGTH3
          BNE ZZZ1
          DEC YPOSP3
          RTS
;
DOWN3     LDX #0
          CLC
```

```
        LDA YPOSP3
        ADC ADDNUM3
        TAY
AAAA1   LDA PLAY3,Y
        STA PLAY3+1,Y
        DEY
        INX
        CPX LENGTH3
        BNE AAAA1
        INC YPOSP3
        RTS
;
SETFLG0 LDA #1      ;SET FLG
        STA SO1FLG
        STA MOVFLG
        LDA #$AF
        STA PITCH1  ;PITCH...
        LDA DIRECT
        STA DIRFLG
        RTS
;
SETFLG  LDA #1
        STA SO2FLG,X
        LDA #$AF
        STA PITCH2,X ;PITCH...
        RTS
;
PLAYFLD0 LDA # <PF0   ;POINT TO...
        STA FILE    ;COLOR 0 SQUARE
        LDA # >PF0
DOSQUARE STA FILE+1
        JSR ADD25   ;ADD 25 POINTS
        JSR PCUBPOS ;GET CUBE POS
        JSR CHANGE  ;CHANGE COLOR
        RTS
;
PLAYFLD1 LDA # <PF1   ;POINT TO...
        STA FILE    ;COLOR 1 SQUARE
        LDA # >PF1
        JMP DOSQUARE ;DO MISC STUFF
;
PLAYFLD2 LDA # <PF2   ;POINT TO...
        STA FILE    ;COLOR 2 SQUARE
        LDA # >PF2
        JMP DOSQUARE ;DO MISC STUFF
;
PLAYFLD3 LDA # <PF3   ;POINT TO...
        STA FILE    ;COLOR 3 SQUARE
        LDA # >PF3
        JMP DOSQUARE ;ETC.
;
CLEAR   LDA #$01    ;RESET COLLISIONS
        STA HITCLR
        RTS
;
TURNOFF LDA #$00    ;NO AUDIO...
        STA AUDC2   ;ON CHANNELS...
        STA AUDF2   ;2, 3, 4!
        STA AUDC3
        STA AUDF3
        STA AUDC4
        STA AUDF4
        RTS
;
PL.PL   LDA P0PL    ;DID MAN...
        CMP #1      ;HIT PLAYER 0?
        BCC BBBB1   ;NO!
        CMP #4      ;HIT PLAYER 2?
        BNE BBBB2   ;NO!
        LDA GRNFLG  ;GREEN MAN ACTIVE?
        CMP #1
        BNE BBBB2   ;NO!
        JSR HITGRN  ;CLOBBER GREEN MAN!
        LDA #2      ;AWARD 200 POINTS!
        STA SUM
        JSR ADD200
        JMP BBBB1
BBBB2   LDA P0PL    ;DID MAN HIT...
        CMP #8      ;PLAYER 3?
        BNE BBBB8   ;NO!
        LDA GRGFLG  ;GEORGE ACTIVE?
        CMP #1
        BEQ BBBB1   ;YES!
BBBB8   LDA WARN1
        CMP #4
        BEQ BBBB7
        INC WARN1
        RTS
BBBB7   LDA #2      ;DEATH DUE TO...
        STA BACK    ;GEORGE!
        RTS
BBBB1   LDA #0
        STA WARN1
        LDA GRGFLG
        CMP #1
        BNE RET
        LDA P3PL
        CMP #1
        BNE BBBB5
        LDA WARN
        CMP #4
        BEQ BBBB6
        INC WARN
        RTS
BBBB6   LDA #2
        STA BACK
        RTS
BBBB5   LDA #0
        STA WARN
        LDA P3PL
        CMP #2
        BCC RET
        CMP #4
        BNE RESET
        LDA GRNFLG
        CMP #1
        BEQ RET
RESET   JSR ERASEGRG ;ERASE GEORGE
        LDA #0      ;CLEAR GEORGE...
        STA GRGFLG  ;VARIABLES
        STA SO4FLG
        STA FNGRDRP
        STA GRGDRP
        STA OUTFLG
        STA GRGMOV
        LDA #10
        STA SCOL
        STA SROW
        LDA #8
        STA COUNT4
        LDA #45
        STA YPOSP3
        LDA #132
        STA XPOSP3
        STA HPOSP3
RET     RTS
;
;
CHECK   LDA NUMSQ   ;GET SQUARES HIT
        CMP #28     ;ALL DONE?
        BNE CCCC1   ;NO!
        LDA #1      ;ROUND COMPLETED!
        STA BACK
CCCC1   RTS
;
;---------------
;SCORE ROUTINES
;---------------
ADD25   LDY #5      ;ADD 25 POINTS
        CLC         ;TO SCORE
        LDA SCORE,Y
        ADC #5
        CMP #$1A
        BNE DDDD1
        LDA #$10
        STA DISP,Y
        STA SCORE,Y
        DEY
        LDA SCORE,Y
        CLC
        ADC #1
        STA SCORE,Y
        JMP DDDD2
DDDD1   LDA #$15
        STA DISP,Y
        STA SCORE,Y
        DEY
DDDD2   LDA SCORE,Y
        CLC
        ADC #2
        CMP #$1A
        BEQ DDDD3
        STA DISP,Y
        STA SCORE,Y
        RTS
DDDD3   LDA #$10
        STA DISP,Y
        STA SCORE,Y
        DEY
        LDA SCORE,Y
        CLC
        ADC #1
        CMP #$1A
        BEQ DDDD3
        STA DISP,Y
        STA SCORE,Y
        RTS
;
ADD200  LDY #3      ;ADD SUM * 100...
        CLC         ;TO SCORE
        LDA SCORE,Y
        ADC SUM
        CMP #$1A
        BCC EEEE1
EEEE2   SEC
        SBC #$1A
        STA ADD
EEEE3   CLC
        LDA #$10
        ADC ADD
        STA DISP,Y
        STA SCORE,Y
        LDA #0
        STA ADD
        DEY
        CLC
        LDA SCORE,Y
        ADC #1
        CMP #$1A
        BEQ EEEE3
EEEE1   STA DISP,Y
        STA SCORE,Y
        RTS
;
;CHARACTER IMAGES
;(MAN, GREEN MAN, GEORGE, ROCKS)
;
FIG1DAT .BYTE 12,30,63,43,43,63
        .BYTE 43,55,30,30,18,18,27
        .BYTE 54,108,72
FIG2DAT .BYTE 48,120,252,212,212,212
        .BYTE 252,212,234,120,120,72
        .BYTE 72,216,108,54,18
FIG3DAT .BYTE 14,31,55,55,31,15
        .BYTE 31,31,14,10,46,62,27
        .BYTE 13,4
FIG4DAT .BYTE 112,248,236,236,248
        .BYTE 240,248,248,112,80,116
        .BYTE 124,216,176,32
GRN1DAT .BYTE 160,80,40,60,126,106
        .BYTE 126,118,60,60,36,54
GRN2DAT .BYTE 5,10,20,60,126,86
        .BYTE 126,110,60,60,36,108
GRG0DAT .BYTE 12,30,30,255,43
        .BYTE 43,255,255,43,51,63
        .BYTE 30,18,18,27,54,108,0
GRG1DAT .BYTE 48,120,120,255,212,212
        .BYTE 255,255,180,204,252,120
        .BYTE 72,72,216,108,54,0
GRG2DAT .BYTE 12,30,30,255,47
        .BYTE 47,255,127,47,31,63
        .BYTE 30,18,18,126,54,27,0
GRG3DAT .BYTE 48,120,120,255,244
        .BYTE 244,255,254,244,248,252
        .BYTE 120,72,72,126,108,216,0
BALDAT  .BYTE 24,60,126,255,255
        .BYTE 255,126,60,24,0
;
;SQUARES !!!
;
PF0     .BYTE $03,$04
PF1     .BYTE $43,$44
PF2     .BYTE $83,$84
PF3     .BYTE $C3,$C4
;
;DISPLAY LIST
;
DLIST   .BYTE $70,$70,$70,$46
        .WORD DISP
        .BYTE 6,6,$86,6,$86,$86,$86,6,6,6
        .BYTE 6,6,6,6,6,6,6,6,6,6
        .BYTE 6,6,6,$41
        .WORD DLIST
RDYMSG  .SBYTE +$80,"READY %%"
LVMSG   .SBYTE "LeVeL"
ENDMSG  .SBYTE +$80,"GAME OVER"
CHGMSG  .SBYTE "CHANGE"
LVLMSG  .SBYTE +$80,"level:"
RNDMSG  .SBYTE +$80,"round:"
BONMSG  .SBYTE +$80,"BONUS"
        .SBYTE " 1000"
TITLE   .SBYTE "    AVALANCHE    "
AUTHOR  .SBYTE "BY TOMMY BENNETT"
MAGMSG  .SBYTE +$80,"ANALOG COMPUTING"
;
;MISC. DATA
;
R1SET   .BYTE 0,15,90,4,156
R2SET   .BYTE 0,134,246,12,146
R3SET   .BYTE 0,26,164,118,84
R4SET   .BYTE 0,196,66,34,102
;
;CHAR SET DATA
;
NEWCHR  .BYTE 3,15,63,127,63,15,3,0
        .BYTE 192,240,252,254,252,240,192,0
        .BYTE 0,6,12,24,48,0,96,0
        .BYTE 12,30,63,63,63,30,18,54
        .BYTE 8,12,126,127,126,12,8,0
        .BYTE 16,48,126,254,126,48,16,0
;
;JUMPING PADS
;
PADATA  .BYTE 3,4,3,4,3,4,3,4
        .BYTE 3,4,3,4,3,4
;
;MUSIC DATA
;
NOTE    .BYTE 60,47,0,47,60,72,60,0
        .BYTE 72,64,72,64,72,64,0,81
        .BYTE 72,81,72,81,72
DUR     .BYTE 11,14,7,11,7,7,7,7
        .BYTE 7,7,7,7,7,7,7,7
        .BYTE 7,7,7,7,7
```

●

Matt*Edit

24K Cassette or Disk

by Matthew J.W. Ratcliff

Matt*Edit is a menu-driven 40-column text and character graphics editor. It was originally developed for the local Bulletin Board System Operators, who frequently create text files for transmitting over the modem to other Atari users. If you have a Gemini or Epson with Graftrax (or Epson graphics compatible) printer, then you will be able to print your text files, using Atari's character set. See the sample printout below (Figure 1). **Matt*Edit** also has the capability of printing in a "newspaper" dual- or triple-column format. This will allow you to put much more information on a single page than the normal 40-character per line print mode. Text files created with the editor can be saved as BASIC routines, as PRINT, PRINT #n; (i.e., ? #6; "text") or DATA statements, with line numbers that you specify.

With this editor, you will quickly learn the hidden value of character graphics. They can be used to make superb title pages for your school papers — or lovely greeting cards. I use it to manage a "chords" file for my wife, who is learning how to play the guitar. Figure 2 gives an example of this. **Matt*Edit** will even allow you to treat disk directories as text files. This enables you to create a complete catalog of all your disks in very short order.

```
MATT*EDIT SAMPLE PRINTOUT

   Character GRAPHICS
   can be used to make
   custom title pages

THIS PROGRAM WILL MANAGE YOUR
DISK CATALOGS AS WELL.  HERE IS
A DIRECTORY FROM THE MATT*EDIT
PROGRAM.

        MATT*EDIT DIRECTORY

DOS      .SYS 039| DUP      .SYS 042
MATTEDIT.LST 119| MATTEDIT.BAS 109
398 FREE SECTORS
```

Figure 1.

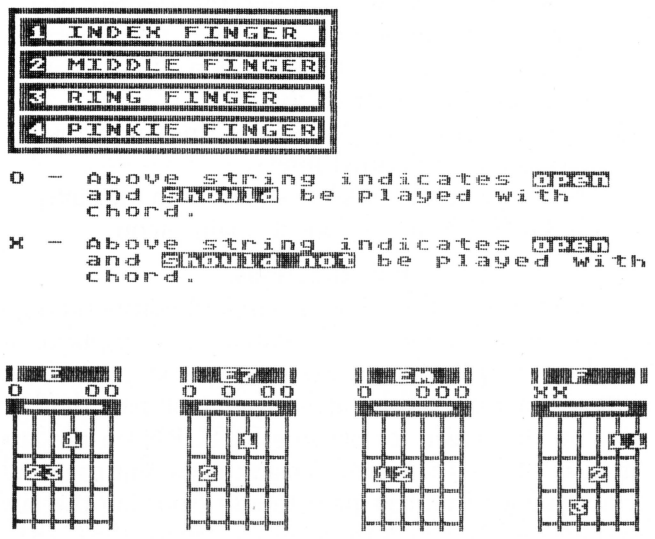

Figure 2.

Below is a rundown on all the menu functions in **Matt*Edit**, along with a short explanation of each item.

Main menu.

1. Disk DIR — Go to the disk directory functions menu.
2. Edit Text — Go to the text editing functions menu.
3. LOAD File — LOAD a new text file into memory. All old text currently in memory will be erased first.
4. Merge File — Merge a text file with the old text currently in memory.
5. SAVE Text — Go to the save text functions menu.
6. Print Text — Go to the print functions menu.
7. Kill File — Delete a file from the disk.
8. Quit — Exit the program.

Disk Directory.

1. LIST DIR — LIST the disk directory to the screen and return to the main menu.
2. PRINT DIR — LIST the disk directory to the screen and make a quick print of it on the printer. You will be asked for a disk title before printing; the same holds true for LOAD and merge functions below.
3. LOAD DIR — LOAD the disk directory into memory. All old text will be deleted.
4. Merge DIR — Merge the disk directory into memory with the old text already there.
5. GOTO Main — Return to the main menu.

Edit text.

1. GOTO Start — Go to the edit mode, at the start of the current text buffer.
2. GOTO End — Go to the edit mode at the end of the current text buffer (last two lines of the file will be displayed at the top of the screen).
3. GOTO a Line — Input the desired line number to begin editing.
4. Delete Line(s) — This function allows you to delete lines of text from the buffer.
5. Insert Line(s) — Place blank lines in the buffer before the specified line.
6. Empty Buffer — Delete all text from the buffer.
7. GOTO Main — Exit to main menu.

Edit functions.

You may use all of Atari's standard editing keys to create text on the screen. A status line is displayed at the bottom of the screen. As you type text, the current line you are on will be updated. Typing past the last line on the screen (or pressing RETURN on the last line) will cause the editor to read the current page and place you on the next page to edit (showing the last two lines worked on at the top). You can use the CTRL-ARROW keys to move anywhere on the screen. Sometimes certain edit functions will cause the cursor to get ahead of the current line number shown in the status line. If in doubt, just press the RETURN key, and it will be updated correctly. Certain keys are disabled when in the edit mode. The SHIFT-CLEAR and CTRL-CLEAR keys are not allowed, so that you cannot accidentally erase a page of work. The ESCAPE key is not allowed in the edit mode, although it is used to abort functions in other parts of the program. If an incorrect keypress is made, you will hear a short buzzing sound. To read the current page and exit to the edit menu, just press the START key.

Once you have created more than one page of text (23 lines), the OPTION key will read the page and move up one page in the buffer, and SELECT will read and move down one page. These key functions make it a simple task to move to any page in the buffer. Note that, if you make any editing changes on the current page, the cursor must be on or below the last changed line in the page before you may press one of the console keys. The read routine only reads text up to the line that the cursor is resting on at the time of the console key press. The SHIFT-INSERT and -DELETE keys will function as well. You should be aware, however, that any text lines shifted down off the page will not appear on the next page of text. If you do not wish to lose any lines, then the Insert Line(s) function should be used. This editor, unfortunately, does not support "parsing" or "word wrap," as it would take too much overhead. You format your text as you type it in. The printout will be exactly as you typed it in with the editor.

SAVE menu.

1. SAVE as Text File — SAVE the current text buffer to a disk file as 40-column text file. All spaces at the end of the lines will be stripped off.
2. SAVE as PRINT Statements — Write text file as ? or ?#n; statements, with user-specified line, increment.
3. SAVE as DATA Statements — Write text file as DATA statements, with user-specific line; increment. If your file has any quotes (" "), you should use this format. The print format will generate errors when ENTERed if it has any quote characters in the print statements.
4. Return to main menu.

SAVE functions.

One SAVE option is to delete all blank lines from the text buffer as it is written to disk. This will make the file compact for you. I tend to use a lot of blank lines, especially if working with character graphics. This allows me to use SHIFT-INSERT and SHIFT-DELETE more liberally while editing the screens of text, without having to go to the Delete Lines and Insert Lines menu functions as often. If you save text as a BASIC PRINT or DATA file, you should also save it as a "40 Char Lines" file. It will be handy, if you should need to go back and edit the text again.

Print options.

1. 40 Char Lines — Print text, 40 characters per line format.

2. Newspaper [2] Col — Print text, 40 character lines, but in dual-column "newspaper" format. Effectively, 80 characters per line.

3. Newspaper [3] Col — Print in three "newspaper" column format.

4. Return to main menu.

Print functions.

You will be requested to input a TITLE for your printout. Press RETURN if none is desired. Pages will always be numbered, however. Single-line spacing will print text *exactly* as it appears on the Atari screen. Double spacing is also provided for. To abort the printing function, just press the ESCAPE key.

On your own.

That should cover the major functions of **Matt*Edit**. I think that you will find the rest of it self explanatory, since the program has many helpful prompts. Should you select any function accidentally, the ESCAPE key will usually exit it.

A special routine is called to input titles and filenames. This routine will not allow invalid text keypresses. Only upper and lower case, numeric keys and punctuation keys are allowed. Backspace editing is the only edit function provided for. This routine will keep you from accidentally clearing the screen in the middle of typing a filename. When in the edit mode, you can use inverse video, control graphics and more. Anytime you exit to a menu, the keyboard will automatically be restored to normal video, upper case characters. You may use CRTL-TAB to clear tabs and SHIFT-TAB to set special tabs for your editing screens. They will remain in effect until you change them.

This program has a couple of short machine language routines, in strings, to speed things up a bit. It will run well on an 800XL, since I followed the proper Operating System (OS) entry points. You should be aware of an XL OS bug, however. Sometimes, while printing, everything will stop for 35 to 40 seconds and then start again. No data is lost, and the program continues to function correctly. I checked with Atari on this problem, and it seems that a "certain combination of characters" being sent to the printer will put the system in a pause mode. Atari has informed me that they are working on a fix for this one. Don't worry if this happens to you; be patient, and all will pick up right where it left off. If you have Atari's **Translator Disk** (converts the 800XL OS to the old OS Rev. A or B, user selectible), it may be used to avoid this "timeout delay" problem. □

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CIRCLE #125 ON READER SERVICE CARD

```
10 DIM PROG$(182),LN$(55):PT=ADR(PROG$
):LX=ADR(LN$):C0=0:C1=1:C2=2:COLR=710:
C7=7:C3=3
20 FOR X=C1 TO 182:READ N:PROG$(X,X)=C
HR$(N):NEXT X:FOR X=C1 TO 55:READ N:LN
$(X,X)=CHR$(N):NEXT X
60 GRAPHICS C0:SIZ=FRE(C0)-256:LW=37:C
4=4:C23=23
70 DIM A$(LW),W$(LW),BL$(LW),T$(LW),B$
(SIZ):B$="":OPEN #C1,C4,C0,"K:":MAXLIN
=INT(SIZ/LW)
80 XCURS=85:YCURS=84:LINES=C1:BL$(C1)=
" ":BL$(LW)=" ":BL$(C2)=BL$
90 CONSOL=53279:KEY=764
100 ? "{":POKE 16,112:POKE 53774,112:A
$=""
110 POKE COLR,128:X=10:GOSUB 430
120 CLOSE #C2:CLOSE #C3:CLOSE #C7
130 ? "   -MAIN MENU-  "
140 ? "  | 1 Disk DIR |  "
150 ? "  | 2Edit Text |  "
160 ? "  | 3Load File |  "
170 ? "  | 4Merge File|  "
180 ? "  | 5Save Text |  "
190 ? "  | 6Print Text|  "
200 ? "  | 7Kill File |  "
210 ? "  |  8   Quit  |  "
220 ? "                 "
230 MN=-C1:MX=8:GOSUB 280:A=X:ON A GOT
O 810,1300,2320,2450,2480,2870,1250,35
70
240 FOR W=15 TO C0 STEP -C1/C2:SOUND C
0,60,10,W:NEXT W:RETURN
250 ? "Try Again Please"
260 FOR W=C1 TO 25:SOUND C0,100,10,8
270 SOUND C0,140,10,8:NEXT W:SOUND C0,
C0,C0,C0:RETURN
280 TRAP 320:POKE 82,C4:? :? "<press #
 key 1-";MX;" [RTN=1] >";:GET #C1,X:IF
 X=155 THEN X=49
290 X=X-48:IF X<C1 OR X>MX THEN 320
300 ? X:POKE 82,C2:IF MN<C0 THEN ? "{"
;:MN=C0
310 RETURN
320 ? :? "Out of range.":GOSUB 260:GOT
O 280
330 MN=C0:GOTO 350
340 MN=C1
350 TRAP 400
360 ? "<Type # & press RTN >":? "(RTN
ONLY=";MN;") ";:INPUT T$:IF LEN(T$)=C0
 THEN X=MN:? X:GOTO 380
370 X=INT(VAL(T$))
380 IF X>=MN AND X<=MX THEN RETURN
390 ? X;"< Out of range (";MN;"-";MX;"
 only).":GOSUB 250:GOTO 350
400 ? "Bad input char(s)"
410 ? "#'s only, ";MN;"-";MX;" valid."
420 GOSUB 250:GOTO 350
430 POKE 702,64:POKE 694,C0:? "{ MATT
WEDIT Rev. 12.0 ":? :? A$
440 ? "Current Lines=";LINES*(LEN(B$))
=LW)
450 ? " Free Lines = ";MAXLIN-LINES+(L
EN(B$)<LW)
460 POKE 82,X:POKE 752,C0:? :RETURN
470 TRAP 500:POKE 702,64:POKE 694,C0:?
 "<Press Y or N) ";:GET #C1,X
480 IF X=89 THEN ? "Yes":X=C1:RETURN
490 IF X=78 THEN ? "No ":X=C0:RETURN
500 ? "Bad Key":GOSUB 250:GOTO 470
510 A$="":CNT=C0
520 ? "<ESC To Abort>":? "Type text &
press RTN:"
530 Y=PEEK(YCURS):IF Y>=22 THEN ? "{ K
EEP TRYING":GOTO 510
540 X=PEEK(XCURS):FOR I=C1 TO LN:? "-"
;:NEXT I:POSITION X,Y:? "-←";
550 TRAP 550:GET #C1,X:IF X=27 THEN PO
P :POP :A$="Aborted":GOTO 110
560 IF X<>126 THEN 590
570 CNT=CNT-C1:IF CNT<C0 THEN GOSUB 26
0:CNT=C0:A$="":GOTO 530
580 ? CHR$(X);:A$=A$(C1,CNT):GOTO 550
590 IF X=155 THEN ? :LN=LEN(A$):RETURN
600 IF X<32 OR X>122 OR X=96 THEN GOSU
B 260:GOTO 550
610 ? CHR$(X);:CNT=CNT+C1:A$(CNT,CNT)=
CHR$(X)
620 IF CNT<=LN THEN 640
630 ? :? "{ TOO LONG!":GOSUB 260:GOTO
510
640 IF CNT>LN-C4 THEN GOSUB 240
650 GOTO 550
660 L1=A-C2
670 X=C2:GOSUB 430
680 ? " DRIVE # ";:MX=C4:GOSUB 280:DR
V=X
690 ? :? " FILENAME to ";
700 ON L1 GOTO 710,720,730,740
710 ? " LOAD ":? "<any OLD text will b
e DELETED >":GOTO 750
720 ? " MERGE ":GOTO 750
730 ? " SAVE text TO":GOTO 750
740 ? " DELETE "
750 ? "(press RTN only for DIR)"
760 LN=12:GOSUB 510:IF LN>C0 THEN 780
770 A=C0:GOSUB 1010:GOTO 670
780 T$="D":T$(C2)=STR$(DRV):T$(C3)=":"
:T$(C4)=A$
790 TRAP 800:OPEN #C2,L2,C0,T$:? :? "W
orking...":RETURN
800 CLOSE #C2:A$="I/O Error ":A$(LEN(
A$)+C1)=STR$(PEEK(195)):POP :GOTO 110
810 A$="":POKE COLR,144
820 X=12:GOSUB 430
830 ? "   -DISK DIR-   "
840 ? "  | 1 List DIR |  "
850 ? "  | 2PRINT DIR |  "
860 ? "  | 3 Load DIR |  "
870 ? "  | 4Merge DIR |  "
880 ? "  | 5GoTo Main |  "
890 ? "                 "
900 MN=-C1:MX=5:GOSUB 280:A=X:ON A GOT
O 910,980,920,960,100
910 A=C0:GOSUB 990:GOTO 100
920 A=C1:? "Load Disk DIR into buffer.
"
930 ? "<OLD TEXT will be LOST>":? "Are
 you SURE ";:GOSUB 470
940 IF  NOT X THEN A$="ABORTED":GOTO 8
20
950 LINES=C0:B$="":GOSUB 990:GOTO 820
960 A=C1:? "Merge DIR into text buffer
."
970 GOSUB 990:A$="DONE":GOTO 820
980 A=C0:C=C1:GOSUB 1000:A$="PRINT DON
E":GOTO 820
990 C=C0
1000 ? "DIR of DRIVE # 1-4 ?":MX=C4:GO
SUB 280:DRV=X
1010 T$="D":T$(C2)=STR$(DRV):T$(C3)=":
*.*"
1020 IF (A OR C) THEN ? :? " TITLE fo
r this DIR ":LN=LW:GOSUB 510:W$=A$:IF
LN=LW THEN 1040
1030 W$(LEN(W$)+C1)=BL$(LEN(W$)+C1)
1040 ? :TRAP 800:CLOSE #C2:OPEN #C2,6,
C0,T$:IF C THEN OPEN #C3,8,C0,"P:":? #
C3;"£A♣"
1050 T$=BL$:TRAP 1180:X=C1:IF C THEN ?
 #C3;W$:? #C3
1060 IF A THEN A$=W$:Y=C1:GOSUB 1160:A
$=BL$:GOSUB 1160
1070 TRAP 1180:INPUT #C2,A$:X=-X:Y=C0
1080 IF A$(C4,5)=" F" THEN A$(17,18)="
 ":GOTO 1100
1090 A$=A$(C3):W$=A$(9):A$(9,9)=".":A$
(10)=W$:A$(17,18)="  ":IF X<C0 THEN A$
(17,18)="| "
1100 ? A$;:IF C THEN ? #C3;A$;
1110 IF X<C0 THEN 1130
1120 ? :IF C THEN ? #C3
1130 IF  NOT A THEN 1070
1140 IF X<C0 THEN T$(C1,18)=A$:GOTO 10
70
1150 T$(19,LW)=A$:A$=T$:GOSUB 1160:GOT
O 1070
1160 LINES=LINES+C1:IF LINES>MAXLIN TH
EN POP :GOTO 1240
1170 B=LW*(LINES-C1)+C1:B$(B,B+LW-C1)=
A$:RETURN
1180 TRAP 800:IF C THEN ? #C3:? #C3:?
#C3
```

```
1190 CLOSE #C2:CLOSE #C3:IF PEEK(195)(
>136 THEN GOTO 800
1200 IF  NOT A THEN GOTO 1230
1210 IF X<C0 THEN A$=T$:A$(19,LW)=BL$(
19,LW):GOSUB 1160
1220 A$=BL$:GOSUB 1160
1230 TRAP 800:? :? "End of DIR (press
RTN to cont)";:GET #C1,A:? :RETURN
1240 LINES=LINES-C1:A$="Incomp. Load,
 BUFF full":RETURN
1250 A$="Kill File":A=6
1260 L2=C4:GOSUB 660:CLOSE #C2
1270 ? "Delete File ";T$:? "Are you SU
RE ";:GOSUB 470
1280 IF  NOT X THEN A$="QUIT":GOTO 110
1290 XIO 33,#C2,C0,C0,T$:A$=T$:A$(LEN(
A$)+C1)=" DELETED":GOTO 110
1300 A$="":POKE COLR,130
1310 X=C2:GOSUB 430
1320 ? "READ KEYS":? "OPTION )& Scrol
l Up 1 Pg"
1330 ? "SELECT )& Scroll Dn 1 Pg"
1340 ? "START )& Exit to EDIT Menu":
POKE 82,13:?
1350 ? "  EDIT TEXT "
1360 ? "1GoTo Start "
1370 ? "2GoTo End   "
1380 ? "3GoTo LINE  "
1390 ? "4Delete Lns "
1400 ? "5Insert Lns "
1410 ? "6Empty BUFF "
1420 ? "7GoTo Main  "
1430 ? "            "
1440 MN=-C1:MX=C7:GOSUB 280:A=X:ON A G
OTO 1450,1460,1500,1530,1630,2250,110
1450 LI=C1:GOTO 1720
1460 LI=LINES:IF LI<C23 THEN GOTO 1730
1470 B=LW*(LI-C1)+C1:IF B$(B,B+LW-C1)(
>BL$ THEN 1490
1480 LI=LI-C1:IF LI>C1 THEN 1470
1490 GOTO 1720
1500 X=C2:GOSUB 430
1510 ? "Go To Line #":MX=LINES:GOSUB 3
40:LI=X
1520 GOTO 1720
1530 IF LEN(B$)<LW THEN A$="BUFF EMPTY
":GOTO 1310
1540 X=C2:GOSUB 430:? "First line to
DELETE ":MX=LINES:GOSUB 340:L1=X
1550 ? "Last  line to  DELETE ":MX=LIN
ES:MN=L1:GOSUB 350:L2=X
1560 ? :? "Delete Lines ) ";L1;" - ";L
2:? "Are you  SURE  ";:GOSUB 470
1570 IF X THEN 1590
1580 A$="Aborted":GOTO 1310
1590 IF L2=LINES THEN B$(LW*(L1-C1)+C1
)="":GOTO 1610
1600 B$(LW*(L1-C1)+C1)=B$(LW*(L2-C1)+L
W+C1)
1610 LINES=LINES-C1-(L2-L1)
1620 A$="Deleted LNS)":A$(LEN(A$)+C1)=
STR$(L1):A$(LEN(A$)+C1)="-":A$(LEN(A$)
+C1)=STR$(L2):GOTO 1310
1630 ? "Insert LINE(S)":IF LEN(B$)<LW
 THEN A$="BUFF Empty":GOTO 1310
1640 ? "Insert BEFORE Line # ":MX=LINE
S:GOSUB 340:L1=X
1650 MX=MAXLIN-LINES:? "# of LINES to
insert ?":? "(MAX=";MX;") ";:GOSUB 340
:L2=X
1660 ? "Are you SURE ";:GOSUB 470:IF
NOT X THEN 1580
1670 ? "Working..":FOR I=LINES+C1 TO L
INES+L2:A=LW*(I-C1)+C1
1680 B$(A,A+LW-C1)=BL$:NEXT I
1690 FOR I=LINES TO L1 STEP -C1
1700 A=LW*(I-C1)+C1:B=LW*(I+L2-C1)+C1:
B$(B,B+LW-C1)=B$(A,A+LW-C1):B$(A,A+LW-
C1)=BL$:NEXT I
1710 LINES=LINES+L2:A$=STR$(L2):A$(LEN
(A$)+C1)=" Lines INSERTED before ":A$(
LEN(A$)+C1)=STR$(L1):GOTO 1310
1720 POKE 752,C1:LE=LI+22:IF LE>LINES
THEN LE=LINES
1730 ? "R";
1740 IF LEN(B$)<LW THEN L1=C1:GOTO 179
0
1750 Y=C0:FOR I=LI TO LE
1760 A=LW*(I-C1)+C1
1770 POSITION C2,Y:? B$(A,A+LW-C1);:Y=
Y+C1
1780 NEXT I
1790 POKE 752,C1:POSITION C2,C23:? "LI
NE # ";LI;"    ";:Y=C0
1800 POSITION 15,C23:? "EDIT MODE <STA
RT=EXIT)";:POKE 752,C0
1810 LOCATE C2,C0,A:POSITION C2,C0
1820 ? CHR$(A);CHR$(30);:X=C2:Y=C0
1830 IF F=C1 THEN ? "↓↓";
1840 TRAP 1840:IF PEEK(KEY)<>255 THEN
GET #C1,A:GOTO 1890
1850 IF PEEK(CONSOL)=C7 THEN 1840
1860 IF PEEK(CONSOL)<>6 AND LINES<C23
THEN GOSUB 260:GOTO 1840
1870 IF PEEK(CONSOL)=6 THEN F=C0:GOTO
2070
1880 IF PEEK(CONSOL)=5 THEN F=C2:GOTO
2070
1890 IF PEEK(CONSOL)=C3 THEN F=C3:GOTO
 2070
1900 IF A=125 OR A=27 THEN GOSUB 260:G
OTO 1840
1910 IF A<>157 THEN 1940
1920 X=PEEK(XCURS):Y=PEEK(YCURS):POKE
752,C1
1930 POSITION C2,22:? CHR$(156);:POKE
752,C0:POSITION X,Y
1940 ? CHR$(A);:IF (A=31 OR A=30) AND
PEEK(XCURS)>38 THEN ? CHR$(A);:GOTO 18
40
1950 IF (A=28 OR A=29) AND PEEK(YCURS)
=C23 THEN ? CHR$(A);:GOTO 1840
1960 IF PEEK(YCURS)=Y AND A<>156 THEN
2020
1970 Y=PEEK(YCURS):X=PEEK(XCURS):POKE
752,C1
1980 IF A=156 THEN POSITION C2,22:? CH
R$(157);:GOTO 2010
1990 IF Y=C23 AND A=155 THEN Y=22:F=C1
:POKE YCURS,22:GOTO 2070
2000 POSITION C2,C23:? "LINE # ";LI+Y;
"   ";
2010 POKE 752,C0:LOCATE X,Y,A:POSITION
 X,Y:? CHR$(A);CHR$(30);
2020 X=PEEK(XCURS):IF X<=38 THEN 2060
2030 IF Y=22 THEN F=C1:GOTO 2070
2040 IF Y<22 THEN Y=Y+C1:? CHR$(155);:
GOTO 2060
2050 LOCATE C2,Y,A:? CHR$(A);CHR$(30);
2060 GOTO 1840
2070 X=PEEK(XCURS):Y=PEEK(YCURS):POKE
752,C1
2080 POSITION 15,C23:? "READING PAGE
       ";:LOCATE X,Y,A
2090 COLOR A:PLOT X,Y:GOSUB 240
2100 FOR Y1=C0 TO Y:BB=LW*(LI-C1+Y1)+C
1
2110 POSITION C1,Y1
2120 POKE 842,13:INPUT A$:POKE 842,12
2130 IF LEN(A$)=LW THEN 2150
2140 A$(LEN(A$)+C1)=BL$(LEN(A$)+C1)
2150 B$(BB,BB+LW-C1)=A$:NEXT Y1
2160 LI=LI+Y:IF LI>LINES THEN LINES=LI
2170 IF F=C1 THEN LI=LI-C1:GOTO 1720
2180 IF F<>C2 THEN 2210
2190 LI=LE+C1:IF LI>LINES THEN LI=LINE
S-C1
2200 GOTO 1720
2210 IF F<>C3 THEN 2240
2220 LI=LI-C23:IF LI<C1 THEN LI=C1
2230 GOTO 1720
2240 A$="** Last line read >>":A$(LEN(
A$)+C1)=STR$(LI):GOTO 1310
2250 A$="Empty BUFF  NOW  *":GOSUB 430
2260 ? "Delete ALL text from BUFF"
2270 ? "Are you SURE ";:GOSUB 470
2280 IF X THEN 2300
2290 GOTO 1580
2300 B$="":LINES=C1:A$="BUFF EMPTY":GO
TO 1310
2310 RETURN
2320 POKE COLR,208:A$="LOAD FILE"
2330 L2=C4:GOSUB 660:LINES=C0:B$=""
2340 TRAP 2400
```

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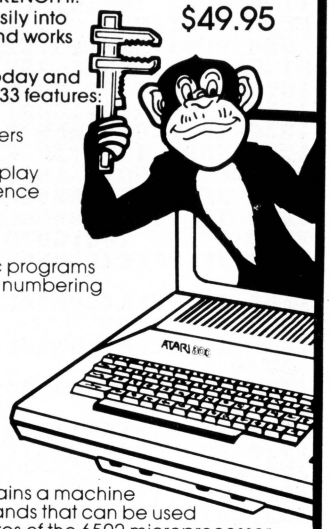

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```
2350 INPUT #C2,A$:IF LEN(A$)=LW THEN 2
370
2360 A$(LEN(A$)+C1)=BL$(LEN(A$)+C1)
2370 LINES=LINES+C1:IF LINES>MAXLIN TH
EN GOTO 2440
2380 B$(LW*(LINES-C1)+C1,LW*(LINES-C1)
+LW)=A$
2390 GOTO 2350
2400 CLOSE #C2
2410 IF PEEK(195)=136 THEN 2430
2420 GOTO 800
2430 A$="END-FILE":GOTO 110
2440 CLOSE #C2:A$="%BUFF Full, File to
o BIG":LINES=MAXLIN:GOTO 110
2450 POKE COLR,178:A$="MERGE FILE"
2460 L2=C4:GOSUB 660
2470 GOTO 2340
2480 IF LEN(B$)>=LW THEN 2500
2490 A$="BUFF Empty":GOTO 110
2500 A$=""
2510 CLOSE #2:POKE COLR,32:X=8:GOSUB 4
30
2520 ? "   SAVE MENU   "
2530 ? "1 As Text File "
2540 ? "2As PRINT Stmnts"
2550 ? "3As DATA Stmnts"
2560 ? "4  Main Menu   "
2570 ? "               "
2580 MN=-C1:MX=C4:GOSUB 280:A=X
2590 IF A=C4 THEN GOTO 100
2600 ? "Delete ALL blank lines from bu
ffer":? "During SAVE ";:GOSUB 470:DB=X
2610 ON A GOTO 2680,2620,2650
2620 ? "File # for PRINT statements":?
 "(i.e. 6 for '? #6;')"
2630 ? "<USE ZERO if NO file #>"
2640 MX=C7:GOSUB 330:F=X:GOTO 2660
2650 ? "Write DATA Statements"
2660 ? "Starting Line # ";:MX=32767-LI
NES:GOSUB 330:SL=X
2670 MX=INT((32767-SL)/LINES):? "Line
Increment ";:GOSUB 340:INC=X
2680 Q=A:A$="SAVE FILE":A=5:L2=8:GOSUB
 660:A=Q
2690 FOR I=C1 TO LINES
2700 B=LW*(I-C1)+C1:IF B$(B,B+LW-C1)=B
L$ AND DB THEN GOTO 2840
2710 IF A=C1 THEN 2780
2720 ? #C2;SL;:SL=SL+INC
2730 ON A-C1 GOTO 2740,2770
2740 ? #C2;" ? ";:IF  NOT F THEN 2760
2750 ? #C2;"#";F;";";
2760 ? #C2;CHR$(34);:GOTO 2780
2770 ? #C2;" DATA ";
2780 A$=B$(B,B+LW-C1)
2790 EL=USR(LX,ADR(A$),LW)
2800 IF EL=C0 THEN GOTO 2820
2810 ? #C2;A$(C1,EL);
2820 IF A=C2 THEN ? #C2;CHR$(34);
2830 ? #C2
2840 NEXT I
2850 A$="Done":IF A>C1 THEN A$(LEN(A$)
+C1)=" Last Line # >":A$(LEN(A$)+C1)=S
TR$(SL)
2860 CLOSE #C2:GOTO 2510
2870 IF LEN(B$)<LW THEN GOTO 2490
2880 A$="":POKE COLR,32
2890 X=8:GOSUB 430
2900 ? "  PRINT OPTIONS  "
2910 ? "1  40 Char Lines "
2920 ? "2Newspaper [2] Col"
2930 ? "3Newspaper [3] Col"
2940 ? "4  Return to Main"
2950 ? "                 "
2960 MN=-C1:MX=C4:GOSUB 280:A=X
2970 IF A=C4 THEN 110
2980 POKE 82,C2:? :? "TITLE for Printo
ut":LN=30:GOSUB 510:W$=A$:W$(LEN(W$)+C
1)=" Pg "
2990 ? "%Center text as it is printed:
":GOSUB 470:CR=X
3000 IF A=C3 THEN LM=C1:GOTO 3020
3010 MX=20*A:? "Left Margin (max=";MX;
")":GOSUB 340:LM=X
3020 ? :? "Vertical line spacing:"
3030 ? "1 Single (screen format)"
3040 ? "2 Double"
3050 ? :MX=C2:GOSUB 280
3060 IF X=C1 THEN SP=8:LPG=96
3070 IF X=C2 THEN SP=16:LPG=48
3080 ? "Get Printer Ready NOW!"
3090 ? "And Press RTN key"
3100 ? "<ESC to abort>"
3110 TRAP 800:GET #C1,X:IF X=155 THEN
3130
3120 IF X=27 THEN A$="Print Aborted":G
OTO 110
3130 TRAP 2420:CLOSE #C7
3140 PG=C1:LPC=LPG-12
3150 OPEN #C7,8,C0,"P:":? #C7;"%A";CHR
$(SP);"%O";
3160 IF A>C1 THEN 3270
3170 DN$=ASC("K"):GOSUB 3460
3180 FOR I=C1 TO LINES
3190 B=LW*(I-C1):A$=B$(B+C1,B+LW):IF A
$=BL$ THEN ? #7:GOTO 3240
3200 IF  NOT (CR) THEN 3230
3210 A=USR(LX,ADR(A$),LW):A=INT((LW-A)
/C2):IF A=C0 THEN 3230
3220 T$=A$:A$=BL$:A$(A)=T$(C1,LW-A)
3230 GOSUB 3500:? #C7
3240 CNT=CNT-C1:IF  NOT (CNT) THEN GOS
UB 3550
3250 NEXT I
3260 ? #C7:CLOSE #C7:A$="PRINT DONE":G
OTO 2870
3270 DN$=ASC("L"):GOSUB 3460
3280 I=C1
3290 FOR J=C1 TO A
3300 IF J=C1 THEN GOSUB 3560
3310 B=LW*(I-C1)+LPC*(J-C1)*LW+C1
3320 IF J>C1 THEN A$="| ":GOSUB 3510
3330 IF B>=LEN(B$) AND J=A THEN 3400
3340 IF B>=LEN(B$) THEN A$=BL$:GOTO 33
80
3350 A$=B$(B,B+LW-C1):IF  NOT (CR) THE
N 3380
3360 X=USR(LX,ADR(A$),LW):X=INT((LW-X)
/2):IF X<=C1 THEN 3380
3370 T$=A$:A$=BL$:A$(X)=T$:A$(LW+C1)="
"
3380 IF A$=BL$ AND J=A THEN 3400
3390 GOSUB 3510
3400 NEXT J
3410 ? #C7:CNT=CNT-C1:IF CNT THEN 3440
3420 I=I+(A-C1)*LPC:IF I>LINES THEN 34
40
3430 GOSUB 3550
3440 I=I+C1:IF I>LINES THEN 3260
3450 GOTO 3290
3460 T$=STR$(PG):PG=PG+C1
3470 ? #7:GOSUB 3560:X=LEN(W$):GOSUB 3
540:X=USR(PT,ADR(W$),LEN(W$)):X=LEN(T$
):GOSUB 3540
3480 X=USR(PT,ADR(T$),LEN(T$)):? #C7:F
OR X=C1 TO 5:? #C7:NEXT X:CNT=LPC:RETU
RN
3490 FOR X=C1 TO C4:? #C7:NEXT X:GOTO
3460
3500 GOSUB 3560
3510 X=LEN(A$):GOSUB 3540:X=USR(PT,ADR
(A$),LEN(A$))
3520 IF PEEK(KEY)<>255 THEN GET #C1,X:
IF X=27 THEN POP :CLOSE #C7:GOTO 3120
3530 RETURN
3540 X=X*8:HI=INT(X/256):LO=X-256*HI:?
 #C7;CHR$(27);CHR$(DN$);CHR$(LO);CHR$(
HI);:RETURN
3550 FOR X=C1 TO C2+(SP=8):? #C7:NEXT
X:? #C7;"%A":? #C7;"%A";CHR$(SP);:GOS
UB 3490:RETURN
3560 X=LM:GOSUB 3540:X=USR(PT,ADR(BL$)
,LM):RETURN
3570 ? "%End Edit NOW! ";:GOSUB 240:G
OSUB 470
3580 IF  NOT X THEN A$="":GOTO 110
3590 GRAPHICS C0:CLR :END
4000 DATA 104,240,10,201,2,240,7,170,1
04,104,202,208,251,96,104,133,213,104,
133,212
4010 DATA 104,104,133,216,160,0,177,21
2,230,212,208,2,230,213,160,0,132,217,
201,128
```

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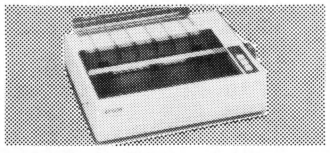

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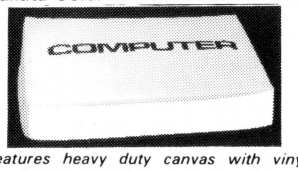

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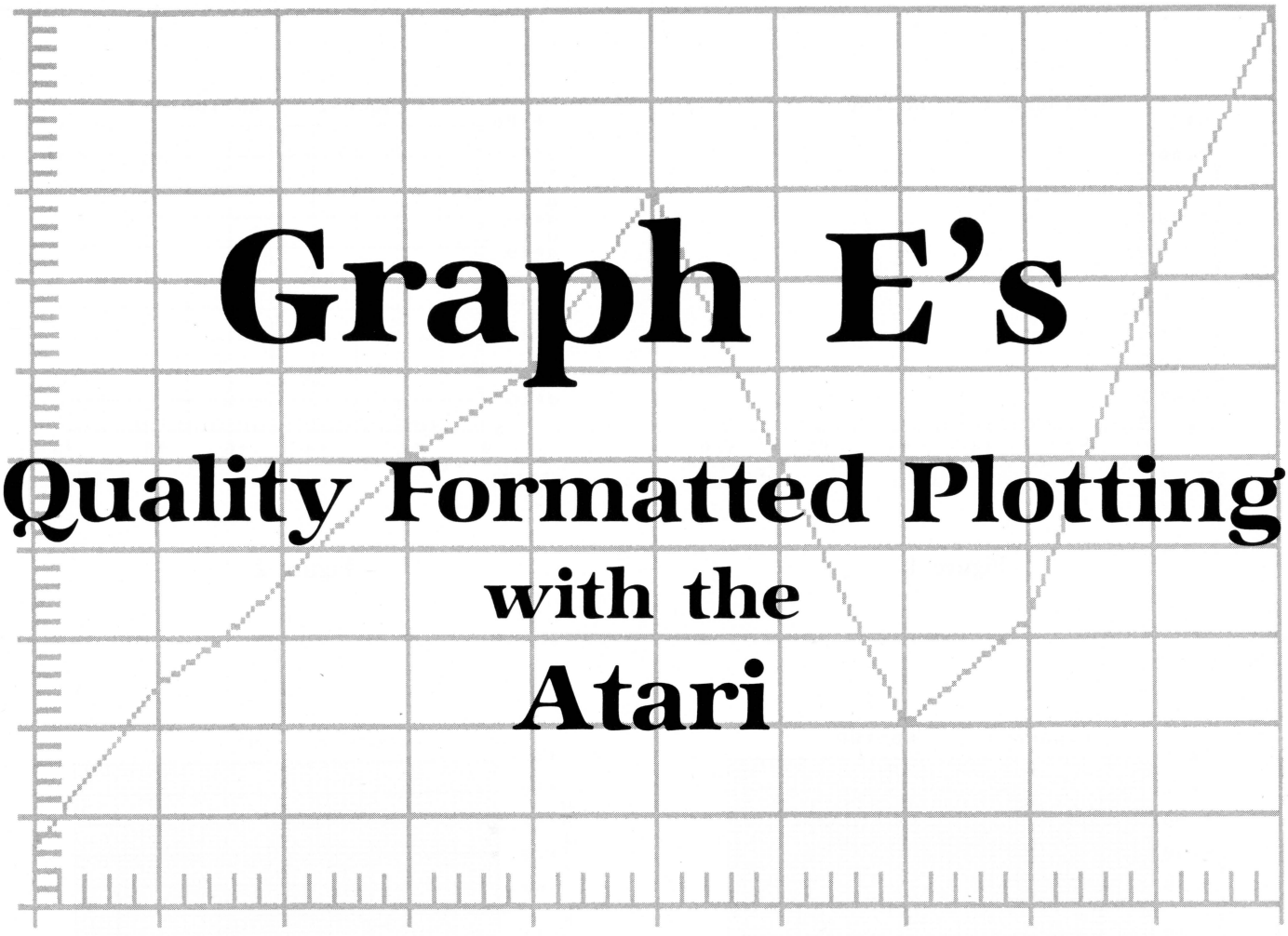
4020 DATA 144,4,41,127,198,217,170,133
,218,224,96,176,11,169,64,224,32,144,2
,169
4030 DATA 224,24,101,218,133,214,169,0
,133,215,162,3,6,214,38,215,202,208,24
9,24
4040 DATA 173,244,2,101,215,133,215,16
0,0,240,2,208,187,162,0,177,214,230,21
4,208
4050 DATA 2,230,215,69,217,149,228,232
,224,8,208,239,162,0,22,228,42,232,224
,8
4060 DATA 208,248,153,220,0,200,192,8,
208,238,162,0,181,220,201,155,208,4,16
9,151
4070 DATA 149,220,232,224,8,208,241,16
2,112,169,11,157,66,3,169,220,157,68,3
,169
4080 DATA 0,157,69,3,169,0,157,73,3,16
9,8,157,72,3,32,86,228,198,216,208
4090 DATA 166,96
4100 DATA 104,240,10,201,2,240,15,170,
104,104,202,208,251,169,0,133,212,169,
1,133
4110 DATA 213,96,104,133,215,104,133,2
14,104,104,168,136,177,214,201,32,208,
9,136,208
4120 DATA 247,177,214,201,32,240,1,200
,132,212,169,0,133,213,96
```

CHECKSUM DATA

(see page 27)

```
10 DATA 690,721,162,784,89,117,133,105
,258,0,145,389,343,577,403,4916
190 DATA 738,338,922,883,53,888,920,42
7,890,667,502,794,588,22,511,9143
340 DATA 361,715,223,473,605,137,57,12
,73,65,965,194,723,822,7,5432
490 DATA 762,664,228,245,895,846,740,9
36,119,643,197,801,787,991,39,8893
640 DATA 179,731,460,529,314,5,620,99,
949,830,254,398,791,804,683,7646
790 DATA 620,98,891,482,579,807,723,73
7,924,952,401,84,605,16,593,8512
940 DATA 923,971,488,31,752,92,280,759
,807,10,579,210,588,982,549,8021
1090 DATA 565,513,901,655,970,51,83,59
0,919,637,904,524,761,916,650,9639
1240 DATA 724,183,830,924,738,437,14,6
80,853,601,793,67,832,567,473,8716
1390 DATA 839,887,807,645,536,772,468,
765,358,766,728,685,515,724,437,9932
1540 DATA 926,625,535,568,596,306,68,5
38,767,245,143,817,35,53,581,6803
1690 DATA 106,399,896,511,260,916,195,
469,274,513,933,638,573,257,70,7010
1840 DATA 140,211,754,276,281,677,823,
924,903,232,207,98,239,907,679,7351
1990 DATA 564,33,758,99,892,621,572,72
0,883,94,343,27,715,653,656,7630
2140 DATA 884,804,194,608,617,484,715,
621,504,718,612,506,6,791,549,8613
2290 DATA 734,424,791,535,214,681,909,
892,612,595,732,743,845,899,683,10289
2440 DATA 501,953,458,731,410,416,386,
352,328,973,403,182,722,782,325,7922
2590 DATA 210,273,291,806,224,572,919,
318,554,382,101,242,926,202,265,6285
2740 DATA 478,291,585,250,576,384,665,
352,920,375,514,90,42,220,837,6579
2890 DATA 430,795,982,637,640,671,662,
335,662,779,487,181,357,666,453,8737
3040 DATA 855,821,747,947,218,798,37,2
44,861,65,795,612,903,717,87,8707
3190 DATA 374,247,408,947,608,761,499,
560,721,255,312,780,20,512,303,7307
3340 DATA 154,71,564,452,672,957,503,6
07,215,966,992,743,409,190,103,7598
3490 DATA 241,969,298,179,801,328,789,
621,678,369,334,394,382,191,131,6705
4040 DATA 324,89,364,237,598,147,290,9
17,577,3543
```



Graph E's

Quality Formatted Plotting with the Atari

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The excellent Atari 800 graphics package allows easy plotting of data on the screen, but, unfortunately, considerable labor is involved in providing titles, legends and scale values. **Graph E's** makes nicely formatted graphs available with a minimum of effort.

Screen dump.

Hardcopy capability greatly enhances the utility of **Graph E's**. I have provided a minimum capability for immediate demonstration purposes by incorporating the "49 Second Screen Dump" program from *Compute's Second Book of Atari*[1]. See Line 3620. Thus, as written, the screen can be dumped to an Epson MX-80 printer with Graphtrax 80 by pressing START after the graph is displayed on the screen. The resulting graph is the small size as shown in Figures 1 through 6. If you have your own screen copy utility, invoke it after the screen display is complete.

The sample plots in Figures 1 through 6 will allow you to quickly judge whether **Graph E's** is useful for your application. Note that these plots are available on your screen whether you have screen dump/printer capability or not.

Samples.

The program as presented includes several built-in plots, so that you can try it out immediately. Once you see the action, I'm sure you will want to replace my examples with your own. The discrete point routine is especially useful, since data not represented by closed form equations can be readily handled. Explanatory remarks are included in the program listing to provide insight into the approach.

Number of points plotted.

In general, curves are drawn more rapidly as the number of points is decreased, but smoother curves result from more points. In the steps beginning with Line 120, the choice of number of points, ND, is requested. As currently dimensioned, 402 points is the upper limit. 100 point curves are adequate for most purposes. Use a small ND for the first runs, to become acquainted with the program flow and screen blanking employed to speed up the program.

For the discrete point routine, ND is superceded so that it is equal to or less than the number of X-Y pairs in the associated data statement. Insert in Line

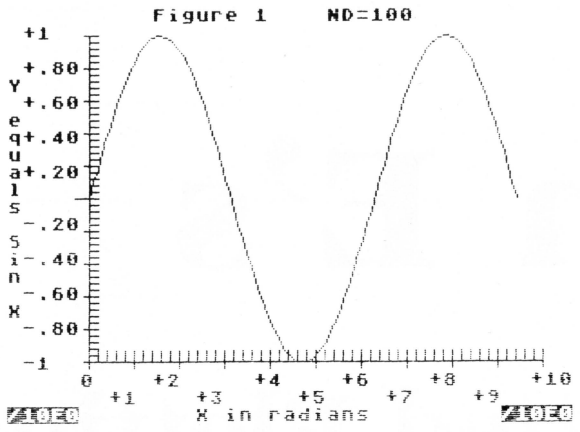

Figure 1.

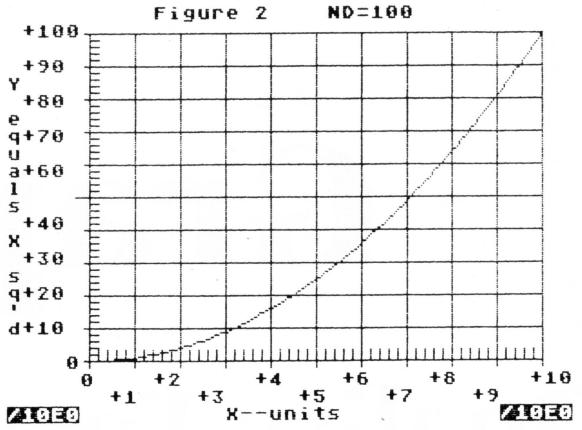

Figure 2.

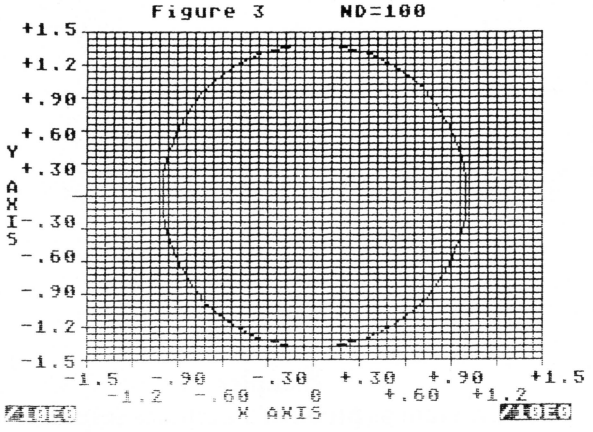

Figure 3.

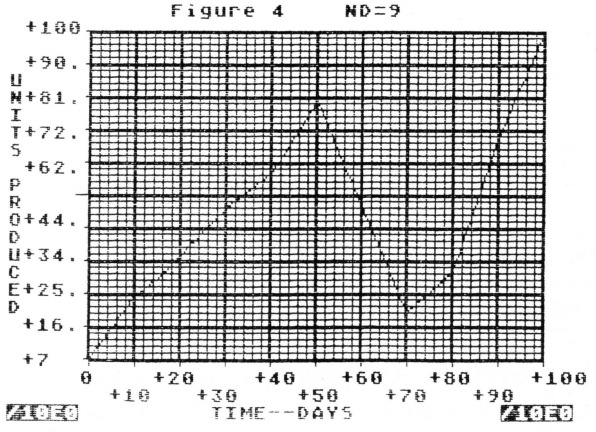

Figure 4.

3110 the ND that is appropriate for your data. Note that sequential pairs are required if the points are to be connected as programmed. (For disconnected points on any plot, use PLOT X(J),Y(J) in Line 760.)

Grid options.

The user has a choice as to the grid, tic mark and axis arrangement. Choices 1, 2, 3 and 4 are illustrated in Figures 1 through 4, respectively. The four built-in plots — 1, 2, 3 and 4 — are also illustrated in these figures.

Once the grid and plot are selected, titles and legends are entered from the keyboard as prompted. Any keyboard character can be used.

Manual or auto scaling.

Auto scaling is most useful for first pass or casual plotting. The manual feature can then be used to get the most suitable arrangement for your purposes. Figure 5 illustrates an auto scaled plot. All other figures are scaled manually.

Since the axis limits are under your control in the manual scale mode, portions of the plot can be enlarged by choosing the range of interest to be the full axis length (see Figure 6).

The scaling routines, and the method of title and legend centering, were provided by Mr. Bregoli[2].

(continued on page 62)

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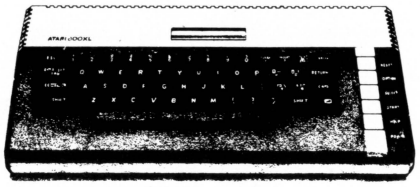

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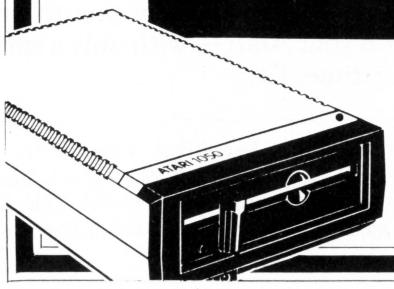

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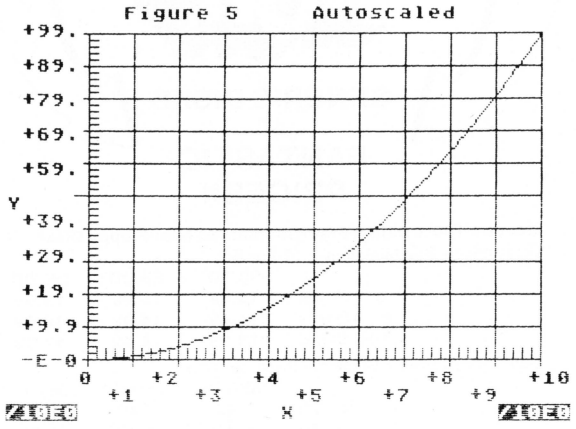

Figure 5.

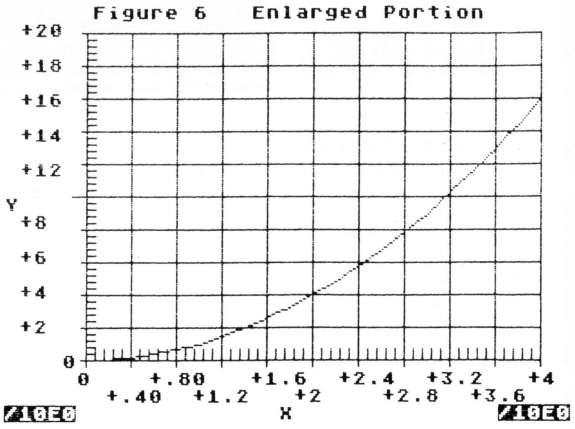

Figure 6.

Mixed graphics.

Text is obtained by drawing graphics 0 characters with the graphics 8 mode. The necessary machine language routine was presented by Mr. Crawford[3]. The routine is flexible and can be relocated. In fact, for this application, it was moved (in page 6), to avoid overlap with the screen dump program.

All printing on the graphics 8+16 screen is done by defining TEXT$ and its starting location, H,V, which is in graphics 0 coordinates. Line 1690 calls the machine language portion loaded in subroutine 1520, through the powerful USR function.

Retention, hard copy and re-entry.

When the graph is completed on the screen, Lines 2550 and 2600 serve to hold it, by suppressing the READY prompt until the user takes further action. To obtain a hard copy with the 49-second screen dump subroutine, press the START key. There will be a pause, followed by a printout. If no printout is required, or if the printout is complete, press the OPTION key to display the re-entry options for drawing a new graph on the screen, modifying the current one or exiting. If you have your own screen dump program, take the appropriate action while the graph is being displayed. If you do not have a printer, the program can be used to produce screen-only graphs, if program lines involving device #5 are deleted.

Approach forces choices.

Several choices were necessary in order to produce consistently useful graphs. It was decided that ten major divisions, with five subdivisions, would be used along each axis. It was also decided that only four characters would be used in the scale values, including the sign and decimal point, if present. If you don't object to encroaching on the Y-axis and overlapping more on the X-axis, the number of characters can be easily changed. One line was allowed for the title, the Y-axis legend, and the X-axis legend and scale factors. The scale factors make the limit of four characters in the scale values acceptable. However, truncation occurs in some instances until a suitable scale is selected. (Values = actual/s.f.)

Screen dump options.

The example plots shown thus far are all small, but the Atari Epson **Screen Dump II** program, for example, which was purchased from Computer Age Software, Silver Springs, Maryland, will produce a printout that substantially fills an 8½×11 page (see Figure 7). The plotting time is greater, however, especially for the 960 dots/line mode. For the most rapid plotting, one uses the 480 dots/line mode and the small plot. With the **Dump II** program, another option gives a white curve on a dark background.

Employment of **Graph E's** will allow you to produce useful graphs on your Atari — with only a small expenditure of your time. □

[1]"49 Second Screen Dump," *Compute's Second Book of Atari*, 1982.

[2]"A BASIC Plotting Subroutine — Sophisticated Plotting with Your MX-80," Lawrence J. Bregoli, *Byte Magazine*, March 1982, Vol. 7, No. 3.

[3]"Mixing Atari Graphics Modes 0 and 8," Douglas Crawford, *Compute*, June 1981, issue 13.

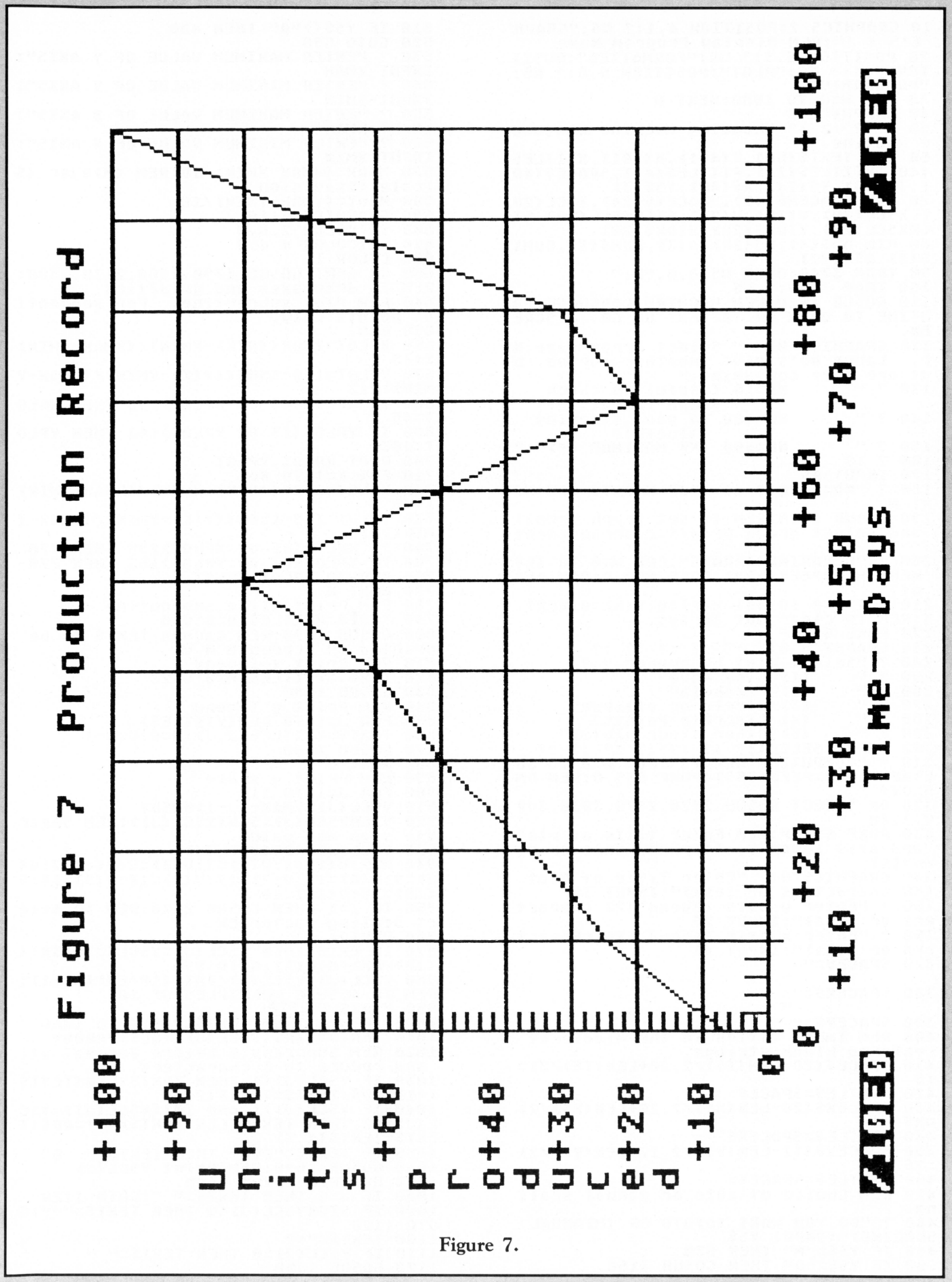
Figure 7 Production Record
Units Produced
+100
+90
+80
+70
+60
+40
+30
+20
+10
0
0 +10 +20 +30 +40 +50 +60 +70 +80 +90 +100
Time—Days
/10E0
/10E0

Figure 7.

```
10 GRAPHICS 2:POSITION 4,1:? #6;"GRAPH
 E'S ! !":REM Display Program Name
20 POSITION 5,3:? #6;"FORMATTED":POSIT
ION 7,4:? #6;"PLOT":POSITION 6,5:? #6;
"PROGRAM!"
30 FOR W=0 TO 1000:NEXT W
40 GRAPHICS 0
50 ? :? :? :? "Loading Machine Languag
e Routine."
60 DIM TEXT$(50),Y(401),X(401),XTITLE$
(40),YTITLE$(24),PTITLE$(40),SPACE$(40
),T$(40),Y$(24),X$(40),YS$(3)
70 DIM SPACEX$(40),SPACEY$(24),YSCL(20
),XSCL(20),V(20),H(20),SIGNYSCL(20),SI
GNXSCL(20),YIDX$(20),XIDX$(20)
80 DIM AD$(4),HS(20),A(3),DUM$(3),DUM1
$(3),A$(192)
90 TRAP 3740:OPEN #5,8,0,"P:"
100 TRAP 3750:? #5
110 GOSUB 1520:REM MACHINE LANGUAGE RO
UTINE TO DRAW GR. 0 TEXT ON GR. 8 SCRE
EN.
120 GRAPHICS 0:? " Select array size,N
D.  Large ND's give smoother curves, b
ut are time consuming."
130 ? "       ND=10 (Useful to check
                graph format.)":?
140 ? "       ND=100 (A good starting
                value)":?
150 ? "       ND=400 (** MAXIMUM **)":?
160 ? :?
170 INPUT ND
180 ? "ND=";ND:? :? :FOR W=0 TO 100:NE
XT W
190 GOSUB 1720:REM To set graph format
 and select graph grid/tic arrangement
.
200 ? "CLEARING ARRAYS":FOR W=0 TO 300
:NEXT W:P=PEEK(559):POKE 559,0:REM DMA
 off
210 FOR K=0 TO 401:X(K)=0:Y(K)=0:NEXT
K:REM To clear out arrays.
220 POKE 559,P
230 GRAPHICS 0:? :? :? :? :? :?
240 ? "Select plot by number.":?
250 ? "    (1) Sine Wave"
260 ? "    (2) Parabola"
270 ? "    (3) Circle or ellipse"
280 ? "    (4) Discrete Points"
290 ? "    (5) Other (Your plot?)"
300 INPUT SELECT:? :? :? :? :? :? :?
310 ? "COMPUTING ARRAYS":FOR W=0 TO 30
0:NEXT W:P=PEEK(559):POKE 559,0:REM DM
A off
320 ON SELECT GOSUB 2920,2970,3030,309
0,3140
330 POKE 559,P:REM Enter title of plot
 and axis legends. [Alphanumeric or sy
mbols]
340 GRAPHICS 0:? "Enter Title of Plot
(40 characters or less)":INPUT T$
350 ? "Enter y axis legend (23 charact
ers or less)":INPUT Y$
360 ? "Enter x axis legend (26 charact
ers or less)":INPUT X$
370 SPACE$="
                "
380 SPACEX$="
                "
390 SPACEY$="
                                "
400 REM Imbed titles in the middle of
centered blank strings.
410 SPACE$(20-LEN(T$)/2,20+LEN(T$)/2)=
T$
420 PTITLE$=SPACE$
430 SPACEX$(20-LEN(X$)/2,20+LEN(X$)/2)
=X$
440 XTITLE$=SPACEX$
450 SPACEY$(12-LEN(Y$)/2,12+LEN(Y$)/2)
=Y$
460 YTITLE$=SPACEY$
470 REM Choice of auto or manual scali
ng.
480 ? "DO YOU WANT (A)UTO OR (M)ANUAL
SCALING)":INPUT YS$
490 IF YS$="M" THEN 530
500 IF YS$="A" THEN GOSUB 3150
510 IF YS$<>"A" THEN 480
520 GOTO 590
530 ? "ENTER MAXIMUM VALUE OF Y AXIS":
INPUT YMAX
540 ? "ENTER MINIMUM VALUE OF Y AXIS":
INPUT YMIN
550 ? "ENTER MAXIMUM VALUE OF X AXIS":
INPUT XMAX
560 ? "ENTER MINIMUM VALUE OF X AXIS":
INPUT XMIN
570 MSDX=(XMAX-XMIN)/10:REM (M)ajor (S
)cale (D)ivision
580 MSDY=(YMAX-YMIN)/10
590 GRAPHICS 8+16
600 SETCOLOR 2,8,0
610 SETCOLOR 4,4,8
620 COLOR 1
630 ON GFMT GOSUB 1790,1960,2130,2300:
REM To draw axes and grid/tics.
640 REM Plot subroutine.  For sequenti
al points only.
650 K=0
660 XPLOT=250*((X(K)-XMIN)/(XMAX-XMIN)
)+45
670 YPLOT=150-150*((Y(K)-YMIN)/(YMAX-Y
MIN))+13
680 IF XPLOT<45 OR XPLOT>295 THEN XPLO
T=45
690 IF YPLOT<13 OR YPLOT>163 THEN YPLO
T=163
700 PLOT XPLOT,YPLOT
710 FOR K=1 TO ND
720 XPLOT=250*((X(K)-XMIN)/(XMAX-XMIN)
)+45
730 YPLOT=150-150*((Y(K)-YMIN)/(YMAX-Y
MIN))+13
740 IF XPLOT<45 OR XPLOT>295 THEN 770
750 IF YPLOT<13 OR YPLOT>163 THEN 770
760 DRAWTO XPLOT,YPLOT
770 NEXT K
780 REM Print title subroutine
790 TEXT$=PTITLE$:H=0:V=0
800 GOSUB 1690:REM Causes TEXT$ to be
printed on screen @ H,V.
810 REM Print x legend
820 TEXT$=XTITLE$:H=0:V=23
830 GOSUB 1690
840 REM Print y legend
850 FOR J=1 TO LEN(YTITLE$)
860 TEXT$=YTITLE$(J,J):H=0:V=J-1
870 GOSUB 1690
880 NEXT J
890 REM Print y scale.
900 FOR J=1 TO 11
910 YSCL(J)=YMAX-(J-1)*MSDY
920 SIGNYSCL(J)=SGN(YSCL(J)):REM Separ
ate sign and value.
930 YSCL(J)=ABS(YSCL(J))
940 H=2:V(1)=1:V(2)=3:V(3)=5:V(4)=7:V(
5)=9:V(6)=11:V(7)=12:V(8)=14:V(9)=16:V
(10)=18:V(11)=20
950 IF J=1 THEN GOSUB 2620:REM To sele
ct scaling factor,EX.
960 V=V(J)
970 IF EX<0 THEN YSCL(J)=YSCL(J)*(INT(
(10^-EX)+0.01)):GOTO 990
980 YSCL(J)=YSCL(J)/INT((10^EX)+0.01):
REM TO ASSURE MULTIPLES OF 10
990 YIDX$="#19E"
1000 IF J=6 THEN TEXT$=" ":GOTO 1050
1010 TEXT$=STR$(YSCL(J)):AD$="0000"
1020 REM Suppress 0 before decimal pt.
 and reduce to 3 characters.
1030 IF YSCL(J)<1 THEN TEXT$(LEN(TEXT$
)+1)=AD$:TEXT$=TEXT$(2,4)
1040 IF YSCL(J)>1 AND INT(YSCL(J))-YSC
L(J)<>0 THEN TEXT$(LEN(TEXT$)+1)=AD$:T
EXT$=TEXT$(1,3)
1050 IF TEXT$="000" THEN TEXT$="  0"
1060 GOSUB 1690:REM Print YSCL(J)
1070 H=1:REM Print sign.
1080 IF J=6 THEN TEXT$=" ":GOTO 1120
1090 IF SIGNYSCL(J)<0 THEN TEXT$="-":G
OTO 1120
1100 TEXT$="+"
1110 IF YSCL(J)=0 THEN TEXT$=" "
1120 GOSUB 1690
```

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CIRCLE #131 ON READER SERVICE CARD

```
1130 NEXT J
1140 H=0:V=23:REM Print yaxis scale fa
ctor.
1150 GOSUB 3520
1160 YIDX$(LEN(YIDX$)+1)=DUM$:TEXT$=YI
DX$
1170 GOSUB 1690
1180 REM Print X scale.
1190 FOR J=1 TO 11
1200 XSCL(J)=XMAX-(J-1)*MSDX
1210 SIGNXSCL(J)=SGN(XSCL(J)):REM Sepa
rate sign and value.
1220 XSCL(J)=ABS(XSCL(J))
1230 IF INT(J/2)-J/2=0 THEN V=22:GOTO
1250:REM IF J IS EVEN THEN....
1240 V=21
1250 H(11)=5:H(10)=8:H(9)=11:H(8)=14:H
(7)=18:H(6)=21:H(5)=24:H(4)=27:H(3)=30
:H(2)=33:H(1)=37
1260 IF J=1 THEN GOSUB 2770
1270 H=H(J)
1280 IF EX<0 THEN XSCL(J)=XSCL(J)*(INT
((10^-EX)+0.01)):GOTO 1300
1290 XSCL(J)=XSCL(J)/INT((10^EX)+0.01)
1300 XIDX$="/10E"
1310 REM
1320 TEXT$=STR$(XSCL(J))
1330 REM See 1020
1340 IF XSCL(J)<1 THEN TEXT$(LEN(TEXT$
)+1)=AD$:TEXT$=TEXT$(2,4)
1350 IF XSCL(J)>1 AND INT(XSCL(J))-XSC
L(J)<>0 THEN TEXT$(LEN(TEXT$)+1)=AD$:T
EXT$=TEXT$(1,3)
1360 IF TEXT$="000" THEN TEXT$="0"
1370 GOSUB 1690:REM Print XSCL(J)
1380 REM Print sign of x scl.
1390 HS(J)=H(J)-1:H=HS(J)
1400 IF INT(J/2)-J/2=0 THEN V=22:GOTO
1420
1410 V=21
1420 IF SIGNXSCL(J)<0 THEN TEXT$="-":G
OTO 1450
1430 TEXT$="+"
1440 IF XSCL(J)=0 THEN TEXT$=" "
1450 GOSUB 1690
1460 NEXT J
1470 H=34:V=23:REM Print Xaxis scale f
actor.
1480 GOSUB 3520
1490 XIDX$(LEN(XIDX$)+1)=DUM$:TEXT$=XI
DX$
1500 GOSUB 1690
1510 GOTO 2470
1520 BYTES=166:REM M.L. SUBROUTINE
1530 ML=1620:REM LOCATED TO GIVE ROOM
FOR GRAPHIC DUMP PROGRAM.
1540 RESTORE 1610
1550 FOR I=0 TO 165
1560 READ A
1570 POKE ML+I,A
1580 NEXT I
1590 RESTORE
1600 RETURN
1610 DATA 104,201,4,240,9,170,240,5,10
4,104,202,208,251,96,104,133,215,104,1
33,214,104,104,168
1620 DATA 104,133,217,104,133,216,104,
104,240,236,133,212,24,165,214,101,88,
133,214,165,89
1630 DATA 101,215,133,215,152,240,15,1
65,214,105,64,133,214,165,215,105,1,13
3,215,136,208,241
1640 DATA 132,221,160,0,132,220,177,21
6,160,0,170,16,1,136,132,213,138,41,96
,208,4,169,64
1650 DATA 16,14,201,32,208,4,169,0,16,
6,201,64,208,2,169,32,133,218,138,41,3
1,5,218,133,218
1660 DATA 169,0,162,3,6,218,42,202,208
,250,109,244,2,133,219,164,221,177,218
,69,213,164,220,145,214
1670 DATA 200,132,220,196,212,208,182,
24,165,214,105,40,133,214,144,2,230,21
5,230,221,169,8
1680 DATA 197,221,208,159,96
1690 A=USR(ML,H,V,ADR(TEXT$),LEN(TEXT$
)):REM H=HORIZ. LOC. OF TEXT$ IN GR. 0
 COORD.,V=VERT. LOC.
1700 TEXT$="
  "
1710 RETURN
1720 GRAPHICS 0:? "Select graph format
 from the following:":?
1730 ? "     (1) Tic marks only":?
1740 ? "     (2) Coarse grid with tic
                 marks":?
1750 ? "     (3) Fine grid":?
1760 ? "     (4) Fine grid with double
                 weight major scale
                 divisions":?
1770 INPUT GFMT
1780 RETURN
1790 PLOT 45,163:DRAWTO 45,13:REM Axes
 with tic marks only.
1800 PLOT 37,88:DRAWTO 45,88:REM At om
itted yscl value.
1810 PLOT 45,163:DRAWTO 295,163
1820 REM :GRID
1830 FOR YTL=13 TO 163 STEP 15:REM (Y)
 (T)IC (L)ARGE
1840 PLOT 42,YTL:DRAWTO 50,YTL
1850 NEXT YTL
1860 FOR YTS=16 TO 160 STEP 3:REM (Y)
(T)IC (S)MALL
1870 PLOT 45,YTS:DRAWTO 50,YTS
1880 NEXT YTS
1890 FOR XTL=45 TO 295 STEP 25:REM (X)
 (T)IC (L)ARGE
1900 PLOT XTL,166:DRAWTO XTL,158
1910 NEXT XTL
1920 FOR XTS=45 TO 295 STEP 5:REM (X)
(T)IC (S)MALL
1930 PLOT XTS,163:DRAWTO XTS,158
1940 NEXT XTS
1950 RETURN
1960 PLOT 45,163:DRAWTO 45,13:REM Axes
 with coarse grid and tic marks.
1970 PLOT 37,88:DRAWTO 45,88:REM At om
itted yscl value.
1980 PLOT 45,163:DRAWTO 295,163
1990 REM :GRID
2000 FOR YTL=13 TO 163 STEP 15:REM (Y)
(T)IC (L)ARGE
2010 PLOT 42,YTL:DRAWTO 295,YTL
2020 NEXT YTL
2030 FOR YTS=16 TO 160 STEP 3:REM (Y)
(T)IC (S)MALL
2040 PLOT 45,YTS:DRAWTO 50,YTS
2050 NEXT YTS
2060 FOR XTL=45 TO 295 STEP 25:REM (X)
 (T)IC (L)ARGE
2070 PLOT XTL,166:DRAWTO XTL,13
2080 NEXT XTL
2090 FOR XTS=45 TO 295 STEP 5:REM (X)
(T)IC (S)MALL
2100 PLOT XTS,163:DRAWTO XTS,158
2110 NEXT XTS
2120 RETURN
2130 PLOT 45,163:DRAWTO 45,13:REM Fine
 grid.
2140 PLOT 37,88:DRAWTO 45,88:REM At om
itted yscl value.
2150 PLOT 45,163:DRAWTO 295,163
2160 REM :GRID
2170 FOR YTL=13 TO 163 STEP 15:REM (Y)
(T)IC (L)ARGE
2180 PLOT 42,YTL:DRAWTO 295,YTL
2190 NEXT YTL
2200 FOR YTS=16 TO 160 STEP 3:REM (Y)
(T)IC (S)MALL
2210 PLOT 45,YTS:DRAWTO 295,YTS
2220 NEXT YTS
2230 FOR XTL=45 TO 295 STEP 25:REM (X)
 (T)IC (L)ARGE
2240 PLOT XTL,166:DRAWTO XTL,13
2250 NEXT XTL
2260 FOR XTS=45 TO 295 STEP 5:REM (X)
(T)IC (S)MALL
2270 PLOT XTS,163:DRAWTO XTS,13
2280 NEXT XTS
2290 RETURN
2300 PLOT 45,163:DRAWTO 45,13:PLOT 44,
163:DRAWTO 44,13:REM DOUBLE WEIGHT LIN
ES.
2310 PLOT 37,88:DRAWTO 45,88:REM At om
itted yscl value.
```

```
2320 PLOT 45,163:DRAWTO 295,163:PLOT 4
5,164:DRAWTO 295,164
2330 REM :GRID
2340 FOR YTL=13 TO 163 STEP 15:REM (Y)
(T)IC (L)ARGE
2350 PLOT 42,YTL:DRAWTO 295,YTL:PLOT 4
5,YTL+1:DRAWTO 295,YTL+1:REM DOUBLE WE
IGHT LINES.
2360 NEXT YTL
2370 FOR YTS=16 TO 160 STEP 3:REM (Y)
(T)IC (S)MALL
2380 PLOT 45,YTS:DRAWTO 295,YTS
2390 NEXT YTS
2400 FOR XTL=45 TO 295 STEP 25:REM (X)
 (T)IC (L)ARGE
2410 PLOT XTL,166:DRAWTO XTL,13:PLOT X
TL-1,163:DRAWTO XTL-1,13
2420 NEXT XTL
2430 FOR XTS=45 TO 295 STEP 5:REM (X)
(T)IC (S)MALL
2440 PLOT XTS,163:DRAWTO XTS,13
2450 NEXT XTS
2460 RETURN
2470 REM Returns here from 2520 to sup
press "READY" prompt until finished wi
th display.
2480 REM "OPTION" key provides the opt
ions shown in 2550 to 2600
2490 POKE 53279,8:P=PEEK(53279):REM RE
AD CONSOLE KEYS.
2500 IF P=3 THEN 2530:REM "OPTION" byp
asses hard copy.
2510 IF P=6 THEN GOSUB 3620:REM "START
" activates 49 sec. screen dump.
2520 GOTO 2470
2530 GRAPHICS 0
2540 ? "Choose option":?
2550 ? "     (1) New plot?":?
2560 ? "     (2) New plot,current ND":?
2570 ? "     (3) New plot,current ND an
d
                grid format":?
2580 ? "     (4) Current plot,new title
s
                and scales":?
2590 ? "     (5) Current plot,new scale
s":?
2600 ? "     (6) Exit ":?
2610 INPUT CHSE:ON CHSE GOTO 120,180,2
00,330,470,3460
2620 REM To scale y axis values to red
uce number of digits.
2630 IF YSCL(1)>=1 AND YSCL(1)<=100 TH
EN EX=0:GOTO 2760
2640 IF YSCL(1)>100 THEN 2660
2650 GOTO 2700
2660 FOR EX=1 TO 10
2670 YPR1=YSCL(1)/INT((10^EX)+0.01)
2680 IF YPR1<100 AND YPR1>1 THEN 2760
2690 NEXT EX
2700 IF YSCL(1)<1 THEN 2720
2710 GOTO 2760
2720 FOR EX=-1 TO -10 STEP -1
2730 YPR1=YSCL(1)*(INT((10^-EX)+0.01))
2740 IF YPR1<100 AND YPR1>1 THEN 2760
2750 NEXT EX
2760 RETURN
2770 REM To scale X axis values to red
uce number of digits.
2780 IF XSCL(1)>=1 AND XSCL(1)<=100 TH
EN EX=0:GOTO 2910
2790 IF XSCL(1)>100 THEN 2810
2800 GOTO 2850
2810 FOR EX=1 TO 10
2820 XPR1=XSCL(1)/INT((10^EX)+0.01)
2830 IF XPR1<100 AND XPR1>1 THEN GOTO
2910
2840 NEXT EX
2850 IF XSCL(1)<1 THEN 2870
2860 GOTO 2910
2870 FOR EX=-1 TO -10 STEP -1
2880 XPR1=XSCL(1)*(INT((10^-EX)+0.01))
2890 IF XPR1<100 AND XPR1>1 THEN GOTO
2910
2900 NEXT EX
2910 RETURN
2920 REM Sine Curve
2930 FOR I=0 TO ND
2940 X(I)=3*3.1416*(I/ND):Y(I)=SIN(X(I
))
2950 NEXT I
2960 RETURN
2970 REM Parabola
2980 FOR I=0 TO ND
2990 X(I)=I/(0.1*ND)
3000 Y(I)=X(I)^2
3010 NEXT I
3020 RETURN
3030 REM Circle or ellipse
3040 FOR I=0 TO ND
3050 THETA=(2*3.1416*I)/ND
3060 X(I)=COS(THETA):Y(I)=SIN(THETA)/0
.72
3070 NEXT I
3080 RETURN
3090 REM Discrete Points
3100 RESTORE 3120
3110 ND=9:FOR J=0 TO ND:READ DUM1,DUM2
:X(J)=DUM1:Y(J)=DUM2:ND=J:NEXT J
3120 DATA 0,7,10,25,15,30,30,50,40,60,
50,80,70,20,80,32,90,70,100,100
3130 RETURN
3140 REM Your Selection
3150 REM Auto scaling subroutines
3160 YMIN=Y(0):XMIN=X(0):YMAX=Y(0):XMA
X=X(0)
3170 FOR I=1 TO ND
3180 IF Y(I)>YMAX THEN YMAX=Y(I)
3190 IF Y(I)<YMIN THEN YMIN=Y(I)
3200 IF X(I)>XMAX THEN XMAX=X(I)
3210 IF X(I)<XMIN THEN XMIN=X(I)
3220 NEXT I
3230 ? "YMAX=";YMAX;" YMIN=";YMIN;" XM
AX=";XMAX;" XMIN=";XMIN
3240 RESTORE 3450
3250 MSDY=(YMAX-YMIN)/10
3260 FOR I=-2 TO 4
3270 FOR K=1 TO 3:READ J
3280 IF MSDY<INT(100*J*10^(I)+0.5)/100
 THEN MSDY=INT(100*J*10^(I)+0.5)/100:G
OTO 3300
3290 NEXT K:RESTORE 3450:NEXT I
3300 FOR I=1 TO -10 STEP -1
3310 IF (YMAX<=I*MSDY)*(YMAX>I*MSDY-0.
99999*MSDY) THEN YMAX=I*MSDY
3320 NEXT I
3330 YMIN=YMAX-10*MSDY
3340 RESTORE 3450
3350 MSDX=(XMAX-XMIN)/10
3360 FOR I=-2 TO 4
3370 FOR K=1 TO 3:READ J
3380 IF MSDX<=INT(100*J*10^(I)+0.5)/10
0 THEN MSDX=INT(100*J*10^(I)+0.5)/100:
GOTO 3400
3390 NEXT K:RESTORE 3450:NEXT I
3400 FOR I=10 TO -10 STEP -1
3410 IF (XMAX<=I*MSDX)*(XMAX>I*MSDX-0.
99999*MSDX) THEN XMAX=I*MSDX
3420 NEXT I
3430 XMIN=XMAX-10*MSDX
3440 RETURN
3450 DATA 1,2,5
3460 GRAPHICS 2:REM Closing display.
3470 POSITION 0,5
3480 ? #6;"SEE YOU NEXT SESSION    "
3490 FOR W=0 TO 100:NEXT W
3500 GRAPHICS 0
3510 END
3520 REM Inverse scale factor.
3530 DUM$="":DUM1$=""
3540 DUM$=STR$(EX)
3550 FOR J=1 TO LEN(DUM$)
3560 A(J)=ASC(DUM$(J,J))
3570 A(J)=A(J)+128
3580 DUM1$(J,J)=CHR$(A(J))
3590 NEXT J
3600 DUM$=DUM1$
3610 RETURN
3620 RESTORE 3710:FOR B=1 TO 61:READ N
:POKE 1535+B,N:NEXT B:DM=PEEK(88)+PEEK
(89)*256:DM=DM+40*191
3630 REM THIS IS 49 SEC. SCREEN DUMP P
ROGRAM. POKE IN M/L PROGRAM AND SET UP
 DISPLAY MEMORY POINTER
3640 TRAP 3740
3650 ? #5;CHR$(27);"A";CHR$(8):FOR X=D
M TO DM+39
```

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CIRCLE #132 ON READER SERVICE CARD


```
3660 REM SET LINE SPACING AND MAKE LOO
P
3670 A$=CHR$(0):A$(192)=CHR$(0):A$(2)=
A$
3680 W=USR(1536,X,ADR(A$)):LPRINT CHR$
(27);"K";CHR$(192);CHR$(0);A$
3690 REM PASS BOTH VALUES TO M/L PROGR
AM AND PRINT STRING
3700 NEXT X
3710 DATA 104,104,141,21,6,104,141,20,
6,104,141,27,6,104,141,26,6,160,193,17
3,255,255,136,240,35,141,255,255,238
3720 DATA 26,6,240,21,173,20,6,56,233,
40,141,20,6,144,4,24,76,19,6,206,21,6,
76,19,6,238,27,6,76,33,6,96
3730 RETURN
3740 OPEN #1,4,0,"K:"
3750 ? "Please turn printer on!!"
3760 ? :? :? :? "Press any key to cont
inue.":? :? :?
3770 GET #1,A
3780 IF A<>255 THEN 100
3790 CLOSE #1
```

CHECKSUM DATA

(see page 27)

```
10 DATA 350,27,508,158,49,236,278,439,
435,275,624,542,637,840,223,5621
160 DATA 240,847,64,83,154,314,875,575
,380,399,261,943,844,167,702,6848
310 DATA 785,81,654,164,181,181,426,48
9,534,6,909,629,799,938,816,7592
460 DATA 948,230,404,826,780,101,732,6
32,637,635,640,206,232,246,461,7710
610 DATA 470,487,101,755,226,559,11,71
9,959,129,246,549,1,32,20,5264
760 DATA 443,765,493,773,328,890,625,8
34,900,683,231,846,768,826,131,9536
910 DATA 668,203,328,264,849,620,522,9
88,184,348,294,642,840,547,277,7574
1060 DATA 582,816,349,0,687,853,964,49
3,501,946,197,969,662,345,986,9350
1210 DATA 292,454,94,209,951,357,371,3
0,720,14,285,302,205,849,554,5687
1360 DATA 284,591,701,213,33,212,15,69
9,864,976,505,35,958,204,974,7264
1510 DATA 733,942,520,189,616,400,351,
507,61,797,732,244,529,8,520,7149
1660 DATA 146,454,338,238,815,801,82,6
46,150,763,888,164,808,913,526,7732
1810 DATA 29,907,706,159,107,202,186,1
24,732,261,103,228,283,120,811,4958
1960 DATA 96,536,39,917,268,404,82,177
,161,99,707,381,85,210,258,4420
2110 DATA 95,786,976,511,14,892,278,41
4,92,180,441,102,710,384,88,5963
2260 DATA 213,406,105,796,231,514,252,
895,281,624,95,190,451,112,713,5878
2410 DATA 104,91,216,409,108,799,134,5
56,947,9,502,736,62,177,398,5248
2560 DATA 553,439,389,710,53,263,430,8
69,314,731,619,355,832,744,286,7587
2710 DATA 742,666,519,831,743,808,372,
876,313,743,620,352,336,745,310,8976
2860 DATA 742,674,523,342,744,809,313,
468,907,518,814,827,473,322,269,8745
3010 DATA 489,785,475,444,64,133,495,7
91,343,180,374,947,789,996,57,7362
3160 DATA 755,451,213,210,200,197,496,
144,196,255,274,109,826,439,310,5075
3310 DATA 628,499,341,199,253,277,112,
338,442,582,618,502,338,799,868,6796
3460 DATA 867,233,507,386,61,273,176,5
77,530,476,42,201,35,515,67,4946
3610 DATA 802,955,239,706,617,326,606,
116,963,554,576,662,807,471,445,8845
3760 DATA 576,863,691,887,3017
```

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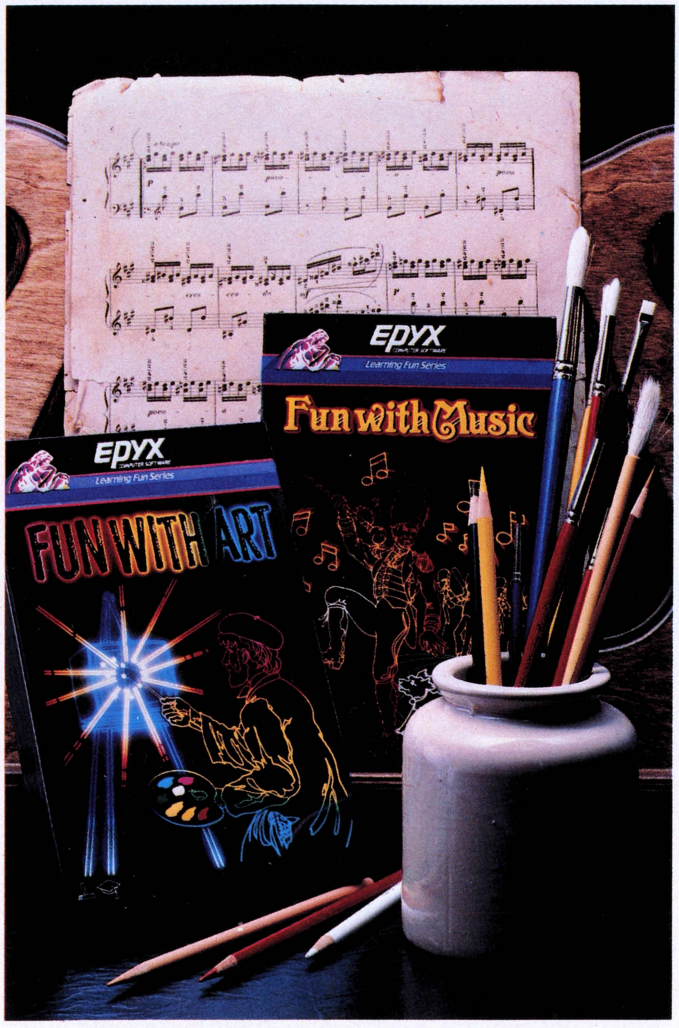
CIRCLE #133 ON READER SERVICE CARD

GIVE YOUR KIDS A LESSON THEY'LL NEVER FORGET.



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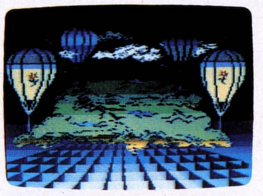

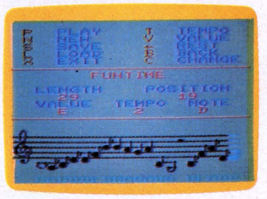

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CIRCLE #134 ON READER SERVICE CARD

CUT & PASTE
ELECTRONIC ARTS
2775 Campus Drive
San Mateo, CA 94403
(415) 571-7171
48K $50.00

by Arthur Leyenberger

Cut & Paste from Electronic Arts is the newest word processor for the Atari computer. Originally released for the Commodore computer, the addition of this word processor brings the total of commercial word processors for the Atari up to eight. Let's take a closer look at what this word processor can do for you, and how it compares to the competition.

The user interface is probably **Cut & Paste**'s strongest feature. There is virtually no way you are going to kill a document if you really do not want to. We are talking *user friendly* here. I was able to start typing this review using the program as soon as I put the disk in the drive.

Using it.

Two disks come with the package: a program disk and a document disk. Once the program disk is booted up, the program politely asks you to insert its document disk, and you are then ready to begin.

The first decision you have to make is to either LOAD an existing document (file) or to create a new one. The top of the screen displays all of the document names currently on the disk. To choose an existing document, the cursor is positioned over the name with the cursor control keys. Then the ESCAPE and RETURN keys are pressed. The file is LOADed, and you may begin typing or editing.

Like most word processors, **Cut & Paste** features an automatic word wrap. You are always in insert mode, which means that, as text is entered, all of the text to the right and below is moved out of the way. Some word processors give you the option of using either an insert or overwrite mode. Insert mode is generally preferred, because you cannot accidentally type over existing text. But overwrite mode is useful when selected portions of your text have to be changed. **Cut & Paste** has no overwrite mode *per se* — although, if you first mark your text, you can overwrite that particular portion of the text.

Various program functions are selected from a scrolling menu bar at the bottom of the screen. The menu is scrolled by using the arrow keys and pressing RETURN to activate the selection. If you want to delete a sentence, for example, you would move the cursor to the beginning of the sentence, press CONTROL-A to indicate (mark) the beginning of the deletion, and use the arrow keys to move the cursor to the end of the sentence. Then you press ESCAPE to enable the bottom function menu, and use the cursor control keys to move the cursor to cut. Finally, you press RETURN, and the text is deleted. To get back into the edit mode, you press ESCAPE again.

This is a rather cumbersome procedure for anything less than a couple of sentences. It has to be used, because the program does not allow the usual Atari editing function of CONTROL-DELETE to delete text to the right of the cursor. Another approach to deleting a sentence is to first move the cursor to the end of the sentence and press the DELETE key. This deletes text to the left as the cursor moves left.

CONTROL-S and CONTROL-E move the cursor to the start and end of the document, respectively. The cursor control keys allow you to move up, down, left and right within the text. Unfortunately, there are no features that allow you to easily and quickly move to the start or end of a line.

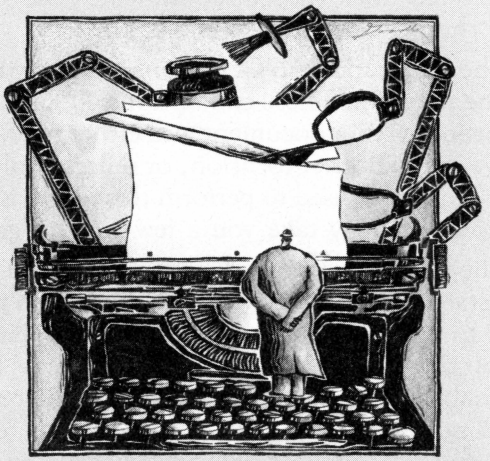
Home management software from Electronic Arts:

Cut & Paste.™

The remarkably simple word processor

by Tim Mott, Steve Hayes,
Norm Lane, David Maynard, Jerry Morrison,
Steve Shaw and Dan Silva.

Until quite recently we used pens and paper and typewriters to write with, mostly because we knew *how* to use them. They're good tools, but rather slow and cumbersome. You tend to make mistakes with them, and getting rid of those mistakes makes extra work. *Cut & Paste* is an inexpensive and practical alternative. Because you can learn to use it in several minutes, you really *will* use it. And that fact alone may make it the first sensible word processor for the home.



ELECTRONIC ARTS™

Cut & Paste.

Other options at the bottom of the screen during the editing session are: SAVE, PRINT, CATALOG, CUT, PASTE, INDENT, UNINDENT and BUFFER. When each of these menu items is selected, easy to understand secondary menus appear. For example, if you selected SAVE, you would have the choice of saving the text under the existing filename, a new filename or not to save at all. If you choose to save the text as the original filename, **C&P** just does it. Selecting SAVE-NEW first displays a catalog of the disk contents and then asks for a filename. If it already exists, you cannot use that name. DON'T SAVE allows you to gracefully return to the edit mode.

One nice touch to **Cut & Paste** is that filenames can be up to twelve characters long. Letters or numbers may be used in any order. Upper and lower case and spaces may also be used. This makes for more clarity in naming documents, since you do not have to abbreviate the name to only eight characters.

The PRINT option allows you to print your document to your printer after first specifying several pieces of information. A one-line, 38-character head may be placed at the top of each page. You can also print page numbers, beginning with any number you like. Other print options include selecting top, bottom, left and right margins. These margin settings are specified in inches rather than characters — since most of us are more familiar with inches than characters — another useful touch.

Up to three sets of printer characteristics may be specified. These settings may then be saved for future use. You can also select double- or single-spaced output, single or continuous sheets and number of copies.

The CATALOG menu selection displays the name of the disk files at the top of the screen but not the size of the files. You can then perform assorted disk operations. Options include disk copying and formatting, file loading, renaming and deleting, and disk drive selection (drive 1 or drive 2). As usual, the menu is scrolled until the cursor indicates the selection, and then the RETURN key is pressed.

The CUT and PASTE options are really the heart of the program. These two options allow you to take a portion of your document and either pick it up and move it to another location, or delete it altogether. The technique used to perform this magic is straightforward but may take you a few tries to get down.

The text is first marked by anchoring the cursor at the starting point and then moving it with the arrow keys to highlight the rest of the text. Then you can either press CONTROL-C directly or press ESCAPE to enable the menu and select CUT. The text that is cut disappears and is stored in the buffer (a temporary storage area), where it can subsequently be PASTEd anywhere in the document. If you CUT another section of text, the previous buffer contents are lost.

Bottom line.

I am generally disappointed with **Cut & Paste**. On one hand, it is very easy to use. Flipping between the edit and various command menu modes was easier and faster than with the **Bank Street Writer** (the main competitor at this price). The built-in fail-safe features ensure that you will not destroy any text before its time.

On the other hand, **Cut & Paste** just does not have enough features to make it a serious choice for anyone doing more than writing an occasional letter. Features such as right justification, underlining, searching and replacing are not available. And you can forget about superscripts and subscripts. Even such basic features as selecting the font of the printer (bypassing printer control codes) and centering text cannot be accomplished.

To top off the list of non-features, the files created by **Cut & Paste** are not Atari DOS compatible files. This means you will be unable to use a spelling checking program or pass files to and from another word processor. Also, the documentation is weak, containing no index and little meaty information.

Electronic Arts is a state-of-the-art software company that has, until now, delivered excellent products with superb packaging. The quality was there, and the price was right. I don't know what went wrong with their design of **Cut & Paste**, but I suspect that they wanted to rush the product to market. In doing so, they have marketed a less than "No-Frills" word processor that provides few features and little value. Other word processors I have used in this price category have more features than **Cut & Paste**.

Even the slickest manuals and state-of-the-art advertising cannot help this product. I guess, with the winning track record that Electronic Arts has demonstrated, one flop is to be tolerated. However, I am embarrassed for Electronic Arts, because **Cut & Paste** is, frankly, a turkey. □

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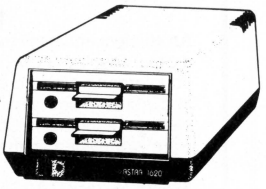

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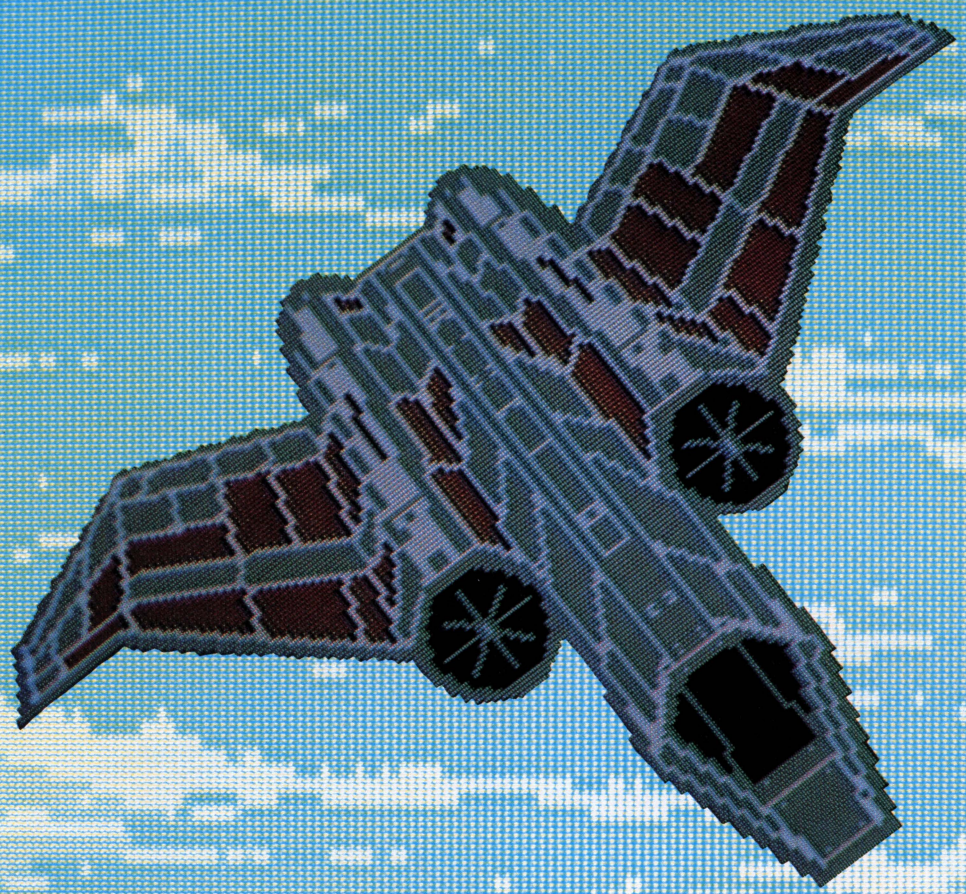

SPY PLANE

24K Cassette or 32K Disk

by Mark Comeau

Your mission, should you choose to accept it, is to recover the lost plans to the top secret satellite. You will be flying a superpowered, highly maneuverable spy plane. You must dodge enemy lasers, rockets and an active volcano. You will either succeed or die in the process. Seven cases of plans must be recovered from the seven multi-colored screens. Report to the base immediately and get your spy plane flying!

Spy Plane is a fast moving, BASIC game that will test your arcade skills to the limit. You must fly your plane through a long cavern full of lasers and missiles. The objective is to capture the seven cases of plans that were stolen from your government base. Only one case is present in the cavern at once. If you get all seven cases, the intermission comes up, you are rewarded 100 points and get an extra man.

You get ten points for every case recovered and 100 points for every set of cases. After seven cases, the lasers fire faster, and the missiles come out of the silos faster.

Running the game.

When you run the game, the screen will go blank for thirty seconds. After that the **Spy Plane** logo will appear (if you typed it in correctly). Press the fire button and hold it down to see the score display screen. Let go of the button, and the game will begin. If you are hit or you collide with anything, hold down the button to see your score and how many men you have. If you press START on the score display, the game will end.

(continued on page 77)

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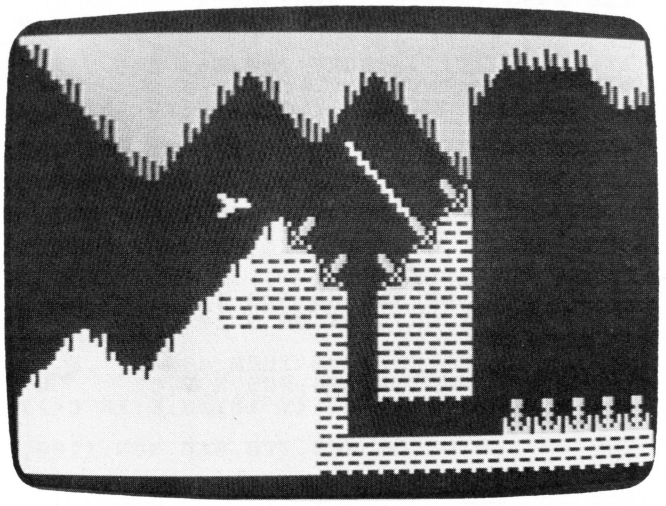
The program.

Spy Plane uses player-missile graphics and character sets in graphics mode 2+16. In this mode you can create graphics 7-type graphics, but you can display them a lot more quickly. When you run the program, the screen will turn white for twenty seconds, then blue for ten seconds. While the screen is white, the computer is setting up the character sets. While the screen is blue, the computer is setting up the player-missile graphics.



When programming a BASIC game, use anything that you can get. I used Tom Hudson's P/M mover from **ANALOG** #10 and Steven Pogatch's character set initializer from **ANALOG** #8. Both do their job effectively, and I am sure that you can hack them out of there for your own use.

The main objective with a BASIC game is not to make it too slow; you should make your main loop as small as possible.

If you look at Lines 1330-2280, you will notice that all of the screens are displayed with print statements. If you want to make your own screen, just modify the print statements. If you want lasers or something special, you will have to modify the screen subroutines. It isn't that hard, I promise you!

Type in the program exactly as it appears. Be careful with the data statements. Use **D:CHECK** or **C:CHECK** to check your work.

One of the best ways to learn about how to make your own games is to analyze other people's games. When you finish typing in this game, improve it! Change it! Learn it! That's how I learned to make games. □

(Program documentation and listing start on page 78.)

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Bacterion! Update

Due to a printing error, a line of the **Bacterion!** BASIC listing (**ANALOG Computing**, issue 20) was difficult to read. Here is the corrected line:

```
2080 DATA 000003FF000
00000000004FF00000000
000005FF0000000000000
6FF00000000000007FF00
000000000055AAFF,320
```

Program breakdown.

Lines	Function
60 - 100	Initial title
160 - 300	Main loop
210 - 450	Death
460 - 620	GOTO screen
630 - 690	Screen #1 (Turns radar)
700 - 820	Screen #2 (Fires laser)
830 - 960	Screen #3 (Fires missile)
970 - 1080	Screen #4 (Fires laser)
1090 - 1150	Screen #5 (Volcano)
1160 - 1310	Screen #6 (Fires laser)
1320 - 2290	Displays screens
2300 - 2420	Screen #7 (Fires laser)
2430 - 2590	Intermission
2600 - 2880	Score display
2890 - 2980	Game over display
2990 - 3090	Enters data for case pos.
3100 - 3170	Data for case positions
3180 - 3190	DIMension everything
3220 - 3320	P/M mover — Tom Hudson
3330 - 3380	Char.Set initializer — Steven Pogatch
3390 - 3740	Char.Set data
3750 - 3780	P/M mover data
3790 - 3840	P/M graphics data

Variables used.

A	For P/M mover
C	Color of character under player
D1$	1st piece of dying plane
D2$	2nd piece of dying plane
E	Also character number of laser
E	Random number for laser
FL	Counter for screen subroutines
LGO$	Characters of logo
MN	Number of planes
NB	Number of screens
P(E)	Positions of cases
PD	DRAWTO position of laser
PE	DRAWTO position of laser
PMC	Data for player facing left
PMD	Data for player facing right
POS	Players' current shape
PX	Horizontal position of laser
PY	Vertical position of laser
PO$	Data for player
P1$	Data for player
P2$	Data for missile (screen #3)
S	Stick position
SC	Score
SCR	Screen number
T	Varied uses
X	Horizontal position of player
Y	Vertical position of player
Z$	Data for blank

```
1 REM
2 REM          SPY PLANE
3 REM     BY  : Mark Comeau
4 REM     FOR : A.N.A.L.O.G
5 REM
50 REM
60 POKE 764,158
70 GRAPHICS 17:POSITION 8,5:? #6;"
SPY PLANE":? #6;"    by Mark Comeau":?
 #6:? #6:? #6;"    initializing"
80 FOR T=0 TO 255:POKE 712,T:NEXT T:PO
KE 712,62:FOR T=0 TO 1000:NEXT T
90 GRAPHICS 8:NB=7:POKE 559,0:POKE 712
,14:GOTO 3180
100 GOSUB 3000
110 X=96:Y=82:POS=PMD:SCR=1
120 GRAPHICS 18:POKE 756,PEEK(106)+1:P
OKE 559,46:FL=-0.1
130 POKE 711,14:POKE 708,56:POKE 710,3
0:POKE 712,2
140 IF FLAG=0 THEN FLAG=1:GOTO 2610
150 GOTO 490
160 REM
170 REM ■■■  MAIN LOOP          ■■■
180 REM ■■■↓↓↓↓↓↓↓↓↓↓↓↓↓↓↓↓↓↓↓■■■
190 S=STICK(0):X=X+(S=7 OR S=6 OR S=5)
*8-(S=11 OR S=10 OR S=9)*8
200 Y=Y+(S=13 OR S=5 OR S=9)*8-(S=14 O
R S=10 OR S=6)*8
210 IF S=7 OR S=6 OR S=5 THEN POS=PMD
220 IF S=11 OR S=11 OR S=10 OR S=9 THE
N POS=PMC
230 IF X=208 OR X=40 THEN 490
240 A=USR(MOVE,0,PMB,POS,X,Y,8)
250 LOCATE (X-48)/8,(Y-18)/8,C:IF C<>3
2 THEN 340
260 ON SCR GOSUB 640,710,840,980,1100,
1170,2310
270 GOTO 190
280 REM ■■■↑↑↑↑↑↑↑↑↑↑↑↑↑↑↑↑↑↑↑■■■
290 REM ■■■  END OF MAIN LOOP   ■■■
300 REM ■■■                     ■■■
310 REM
320 REM ■■■  DEATH              ■■■
330 REM
340 IF C=249 THEN 570
350 POP :D=244:POKE 53278,0
360 MN=MN-1:IF MN=0 THEN 2900
370 FOR K=Y TO Y+18
380 A=USR(MOVE,0,PMB,D2,X,K,8)
390 A=USR(MOVE,0,PMB,D1,X,Y-(K-Y),8)
400 SOUND 0,RND(0)*14,0,14:NEXT K
410 A=USR(MOVE,0,PMB,Z,0,0,8)
420 A=USR(MOVE,0,PMB,Z,0,0,8)
430 POKE 704,62:FL=-0.1:IF STRIG(0)=1
THEN 110
440 GOTO 2720
450 REM
460 REM
470 REM
480 REM ■■■  GOTO SCREEN        ■■■
490 IF X=208 THEN SCR=SCR+1:X=48
500 POKE 77,0
510 IF X=48 THEN SCR=SCR-1:X=200
520 A=USR(MOVE,0,PMB,POS,X,Y,8)
530 POSITION 0,0:SOUND 0,0,0,0:POKE 55
9,0
540 GOSUB SCR*140+1190:POKE 559,46
550 IF S(NM)=SCR THEN COLOR 249:E=SCR*
2:PLOT P(E-1),P(E)
560 FL=-0.1:GOTO 190
570 FOR W=14 TO 0 STEP -1:SOUND 0,100+
W,14,W:SOUND 1,100-W,14,W:NEXT W:NM=NM
+1:SC=SC+10
580 IF NM=8 THEN 2440
590 COLOR 32:E=SCR*2:PLOT P(E-1),P(E):
GOTO 190
600 REM
610 REM
620 REM
630 REM ■■■  SCREEN #1 SUB     ■■■
640 FL=FL+0.1:IF FL>3.9 THEN FL=0
650 IF FL=0 THEN D=244:SOUND 0,36,4,2
660 IF FL=1 THEN D=245:SOUND 0,35,4,2
670 IF FL=2 THEN D=246:SOUND 0,34,4,2
680 IF FL=3 THEN D=245:SOUND 0,33,4,2
690 COLOR D:PLOT 3,7:RETURN
```

```
700 REM ▒▒▒ SCREEN #2 SUB     ▒▒▒
710 FL=FL+1:IF FL<WV THEN RETURN
720 FL=0
730 E=INT(RND(0)*5)+1:IF E=1 THEN E=81
:PX=7:PY=5:PD=11:PE=1
740 IF E=2 THEN E=79:PX=12:PY=10:PD=6:
PE=4
750 IF E=3 THEN E=80:PX=16:PY=9:PD=16:
PE=6
760 IF E=4 THEN E=80:PX=17:PY=9:PD=17:
PE=5
770 IF E=5 THEN E=80:PX=18:PY=9:PD=18:
PE=2
780 COLOR E+160:PLOT PX,PY:DRAWTO PD,P
E
790 FOR T=14 TO 0 STEP -1:SOUND 0,T,2,
T:NEXT T
800 LOCATE (X-48)/8,(Y-18)/8,C:IF C<>3
2 THEN 340
810 SOUND 0,0,0,0:COLOR 32:PLOT PX,PY:
DRAWTO PD,PE
820 RETURN
830 REM ▒▒▒ SCREEN #3 SUB     ▒▒▒
840 FL=INT(FL)+1:IF FL<WV THEN RETURN
850 IF FL=20 THEN FL=999:T=INT(RND(0)*
9)+1:COLOR 87:PLOT T*2,9:SOUND 0,RND(0
)*100+155,8,7:RETURN
860 IF FL=1002 THEN COLOR 88:SOUND 0,R
ND(0)*100+155,8,14:PLOT T*2,9:RETURN
870 IF FL=1003 THEN COLOR 87:SOUND 0,R
ND(0)*100+155,8,14:PLOT T*2,9:RETURN
880 IF FL<1006 THEN RETURN
890 COLOR 32:PLOT T*2,9:SOUND 0,0,0,0:
FL=(T*2)*8+48
900 FOR T=8 TO 1 STEP -1
910 SOUND 0,14-T,0,14-T:PE=96-(8-T):A=
USR(MOVE,1,PMB,PME,FL,PE,8-T)
920 NEXT T
930 FOR T=88 TO 22 STEP -4:A=USR(MOVE,
1,PMB,PME,FL,T,8):NEXT T
940 A=USR(MOVE,1,PMB,Z,0,0,8)
950 IF PEEK(53260)>0 THEN 340
960 FL=0:SOUND 0,0,0,0:RETURN
970 REM ▒▒▒ SCREEN #4 SUB     ▒▒▒
980 FL=FL+1:IF FL<WV THEN RETURN
990 T=INT(RND(0)*6)+1:IF T=1 THEN PX=1
:PY=9:PD=1:PE=1:D=208
1000 IF T=2 THEN PX=2:PY=9:PD=2:PE=2:D
=208
1010 IF T=3 THEN PX=7:PY=8:PD=0:PE=1:D
=207
1020 IF T=4 THEN PX=15:PY=4:PD=14:PE=3
:D=207
1030 IF T=5 THEN PX=16:PY=4:PD=14:PE=2
:D=207
1040 IF T=6 THEN PX=12:PY=9:PD=12:PE=7
:D=208
1050 SOUND 0,10,4,14:COLOR D:PLOT PX,P
Y:DRAWTO PD,PE
1060 FOR T=14 TO 7 STEP -1:SOUND 0,T,4
,T:NEXT T
1070 LOCATE (X-48)/8,(Y-18)/8,C:IF C<>
32 THEN 340
1080 COLOR 32:PLOT PX,PY:DRAWTO PD,PE:
SOUND 0,0,0,0:FL=0:RETURN
1090 REM ▒▒▒ SCREEN SUB #5     ▒▒▒
1100 FL=FL+1:IF FL<INT(RND(0)*10)+4 TH
EN RETURN
1110 SOUND 0,255,8,14:IF INT(RND(0)*2)
=1 THEN COLOR 87:GOTO 1130
1120 COLOR 88
1130 PLOT 8,5:DRAWTO 8,1
1140 LOCATE (X-48)/8,(Y-18)/8,C:IF C<>
32 THEN 340
1150 COLOR 32:PLOT 8,5:DRAWTO 8,1:SOUN
D 0,255,8,2:FL=0:RETURN
1160 REM ▒▒▒ SCREEN SUB #6     ▒▒▒
1170 FL=FL+1:IF FL<WV THEN RETURN
1180 T=INT(RND(0)*9)+1:IF T=1 THEN PX=
9:PY=4:PD=11:PE=2:D=209
1190 IF T=2 THEN PX=10:PY=5:PD=12:PE=3
:D=209
1200 IF T=3 THEN PX=10:PY=5:PD=7:PE=2:
D=207
1210 IF T=4 THEN PX=11:PY=4:PD=10:PE=3
:D=207
1220 IF T=5 THEN PX=15:PY=9:PD=15:PE=1
:D=208
1230 IF T=6 THEN PX=16:PY=9:PD=16:PE=1
:D=208
1240 IF T=7 THEN PX=17:PY=9:PD=17:PE=1
:D=208
1250 IF T=8 THEN PX=18:PY=9:PD=18:PE=2
:D=208
1260 IF T=9 THEN PX=19:PY=9:PD=19:PE=2
:D=208
1270 COLOR D:PLOT PX,PY:DRAWTO PD,PE
1280 FOR T=100 TO 0 STEP -10:SOUND 0,T
,14,14:NEXT T
1290 LOCATE (X-48)/8,(Y-18)/8,C:IF C<>
32 THEN 340
1300 SOUND 0,0,0,0:COLOR 32:PLOT PX,PY
:DRAWTO PD,PE
1310 FL=0:RETURN
1320 REM ▒▒▒ SCREEN #1     ▒▒▒
1330 ? #6;LG0$;
1340 ? #6;"bbbbbbbbbbbbbbbbbbbb";
1350 ? #6;"bCE CE  CE  CE CE   ";
1360 ? #6;"b                   ";
1370 ? #6;"b                   ";
1380 ? #6;"b                   ";
1390 ? #6;"b                   ";
1400 ? #6;"b  t                ";
1410 ? #6;"b  rs               ";
1420 ? #6;"b FAAAAAH           ";
1430 ? #6;"bbbbAAAAAAAAAAAAAAAA";
1440 ? #6;LG2$;
1450 RETURN
1460 REM ▒▒▒ SCREEN #2     ▒▒▒
1470 ? #6;"bbbbbbbbbDDDDDDDDDAA";
1480 ? #6;" CbbbbbbE         CA";
1490 ? #6;"  CbbbbE      FGGGGH  C";
1500 ? #6;"   CbbE     FAAAAAAH   ";
1510 ? #6;"    CE    FAAAAAAAE   ";
1520 ? #6;"         CAAAAAAE     ";
1530 ? #6;"       F1   CAAAAE    ";
1540 ? #6;"     FAAH     CAAE    ";
1550 ? #6;"    FAAAAH     CE     ";
1560 ? #6;"  FAAAAAAH            ";
1570 ? #6;" FAAAAAAAAH       FkkkG";
1580 ? #6;"FAAAAAAAAAAGG jGAAAAA";
1590 RETURN
1600 REM ▒▒▒ SCREEN #3     ▒▒▒
1610 ? #6;"bbbbbbbbbbbbbbbbbbbb";
1620 ? #6;" b     b          b  ";
1630 ? #6;" b     b b     b  b b";
1640 ? #6;" b b   b b b   b b b b";
1650 ? #6;" b b   b b b   b   b b";
1660 ? #6;"   b b b b b   b   b b";
1670 ? #6;"   b b b b   b b b b b";
1680 ? #6;"   b b b b b b b b b b";
1690 ? #6;"     b b b   b b b b ";
1700 ? #6;"       b     b   b b ";
1710 ? #6;" FnGnbnGnGnGnGnGnGnGnb";
1720 ? #6;"FAAAAAAAAAAAAAAAAAAA";
1730 RETURN
1740 REM ▒▒▒ SCREEN #4     ▒▒▒
1750 ? #6;"DDAAAAECABBBBBBBBBBb";
1760 ? #6;"   CAAE   CB     bbBBBbb";
1770 ? #6;"    CE      B  b  b  bBB  b";
1780 ? #6;"         FH     b      b  b";
1790 ? #6;"       FAAGGbbbb        b";
1800 ? #6;"       CDDDE         bjj b";
1810 ? #6;"         bbbb  bbbbbbb  b";
1820 ? #6;"           b       b    b";
1830 ? #6;"       FH      bb  bbbbbbb";
1840 ? #6;"      FAAHfbbb      b    ";
1850 ? #6;" kkFAAAAAAAAkVb     bb  ";
1860 ? #6;"GAAAAAAAAAAAAAAAAAAb";
1870 RETURN
1880 REM ▒▒▒ SCREEN #5     ▒▒▒
1890 ? #6;"bbbbbbbbbbbbbbbbbbbb";
1900 ? #6;"  b     b          b  ";
1910 ? #6;"  b     b        b   b ";
1920 ? #6;"  b b   b      b   b   ";
1930 ? #6;"  b     b      b   b   ";
1940 ? #6;"  b b     F H  b     b ";
1950 ? #6;"  b b   FAAAHb        ";
1960 ? #6;"    b  FAAAAAb      F  ";
1970 ? #6;"    bFAAAAAAAH    FAH  ";
1980 ? #6;"    bAAAAAAAAAAHFAAAHb";
1990 ? #6;"  FAAAAAAAAAAAAAAAAb";
2000 ? #6;"bbAAAAAAAAAAAAAAAAAAb";
2010 RETURN
2020 REM ▒▒▒ SCREEN #6     ▒▒▒
```

```
2030 ? #6;"CAAAAAAAAAAAAAADDDAA";
2040 ? #6;" CAAAAECAAECAAE    CD";
2050 ? #6;"  CAAE  CE  CA       ";
2060 ? #6;"   CE       C       ";
2070 ? #6;"                    ";
2080 ? #6;"          F1    jb  ";
2090 ? #6;"        Fbb1  jbb   ";
2100 ? #6;"      Fbbbb bbb     ";
2110 ? #6;" FH FAAAAb bbb      ";
2120 ? #6;"FAAGAAAAAb bbb      ";
2130 ? #6;"AAAAAAAAAb     kkkkk";
2140 ? #6;"AAAAAAAAAbbbbbbbbbbb";
2150 RETURN
2160 REM ■■■ SCREEN #7          ■■■
2170 ? #6;"ADDDDDDbAAAAAAAAADDDD";
2180 ? #6;"E       bAAAAAAAE    B";
2190 ? #6;"  b     bAAAAAAE     B";
2200 ? #6;" bb     bAAAAAE      B";
2210 ? #6;" bb     bAAAAE       B";
2220 ? #6;" bb     bAAAE        B";
2230 ? #6;" bb     bAAE         B";
2240 ? #6;" bb     bAE       FH B";
2250 ? #6;" bb     bE      FAAHB";
2260 ? #6;" bb           FAAAAA";
2270 ? #6;" bbk k j l l FAAAAAA";
2280 ? #6;"GAAAAAAAAAAAAAAAAAAA";
2290 RETURN
2300 REM ■■■ SCREEN SUB #7    ■■■
2310 FL=FL+1:IF FL<WV THEN RETURN
2320 FL=0
2330 E=INT(RND(0)*5)+1:IF E=1 THEN E=8
0:PX=3:PY=9:PD=3:PE=1
2340 IF E=2 THEN E=80:PX=5:PY=9:PD=5:P
E=1
2350 IF E=3 THEN E=79:PX=6:PY=9:PD=3:P
E=6
2360 IF E=4 THEN E=81:PX=10:PY=9:PD=18
:PE=1
2370 IF E=5 THEN E=81:PX=12:PY=9:PD=18
:PE=3
2380 COLOR E+160:PLOT PX,PY:DRAWTO PD,
PE
2390 FOR T=14 TO 0 STEP -1:SOUND 0,T,2
,T:NEXT T
2400 LOCATE (X-48)/8,(Y-18)/8,C:IF C<>
32 THEN 340
2410 SOUND 0,0,0,0:COLOR 32:PLOT PX,PY
:DRAWTO PD,PE
2420 RETURN
2430 REM ■■■ FINI              ■■■
2440 GRAPHICS 18:POKE 559,46
2450 POSITION 2,5:? #6;"Congratulation
s!"
2460 FOR T=0 TO 100:POKE 712,RND(0)*25
5:NEXT T:POKE 712,0
2470 POSITION 2,7:? #6;"score :"
2480 FOR SC=SC TO SC+100 STEP 10:POSIT
ION 9,7:? #6;SC
2490 FOR T=14 TO 0 STEP -1
2500 SOUND 0,14-T,14,T:NEXT T:NEXT SC
2510 POSITION 2,3:? #6;"EXTRA MAN!!!!
!!":MN=MN+1
2520 IF MN=19 THEN MN=18
2530 FOR T=0 TO 255 STEP 5
2540 POKE 710,T:SOUND 0,T,14,14
2550 NEXT T
2560 SOUND 0,0,0,0
2570 WV=WV-3:IF WV<10 THEN WV=10
2580 GOSUB 3000:GOTO 110
2590 REM
2600 REM ■■■ TITLE DISPLAY    ■■■
2610 COLOR ASC("Z"):PLOT 0,0:DRAWTO 19
,0:PLOT 19,11:DRAWTO 0,11:PLOT 0,1:DRA
WTO 19,1
2620 PLOT 0,10:DRAWTO 19,10
2630 POSITION 0,2:? #6;LGO$;LG2$;LGO$;
LG2$;LGO$;LG2$;LGO$;LG2$;:WV=0
2640 FOR X=0 TO 7:POKE 464+X+START,255
:NEXT X
2650 FOR X=0 TO 7:POKE 464+X+START,0:N
EXT X:POKE 712,RND(0)*255
2660 IF STRIG(0)=0 THEN WV=20:MN=7:NM=
1:SC=0:GOTO 2720
2670 WV=WV+1:IF WV=50 AND FLAG=2 THEN
2900
2680 GOTO 2640
2690 SOUND 0,0,0,0:SOUND 1,0,0,0
2700 REM
2710 REM ■■■ DISPLAY SCORE    ■■■
2720 ? #6;"{":POSITION 0,0:POKE 712,2
2730 SOUND 0,0,0,0:SOUND 1,0,0,0
2740 ? #6;LG2$;
2750 ? #6;"CAAAAECECAAAAAAAAECE";
2760 ? #6;" CAAE     CAAAAAAE    ";
2770 ? #6;"  CE       CAAAAE     ";
2780 ? #6;"             CECE      ";
2790 COLOR 188:PLOT 2,5:DRAWTO 1+MN,5
2800 POSITION 4,6:? #6;SC
2810 ? #6;"H     FHFH          FHF";
2820 ? #6;"AH   FAAAAH       FAAA";
2830 ? #6;"AAHFAAAAAAH      FAAAA";
2840 ? #6;"AAAAAAAAAAAHFHFAAAAA";
2850 ? #6;LGO$;
2860 IF PEEK(53279)=6 THEN 2900
2870 IF STRIG(0)=0 THEN 2860
2880 GOTO 110
2890 REM ■■■ GAME OVER        ■■■
2900 GRAPHICS 18:POKE 559,46:? #6;"
  GAME OVER"
2910 SOUND 0,0,0,0:SOUND 1,0,0,0
2920 A=USR(MOVE,0,PMB,Z,0,0,8)
2930 POSITION 5,3:? #6;"score:";SC
2940 POSITION 2,9:? #6;"by :Mark Comea
u"
2950 POSITION 5,6:? #6;"spy plane"
2960 FOR WV=0 TO 100:POKE 711,RND(0)*2
55:NEXT WV:WV=0:FLAG=2:GOSUB 3000
2970 POKE 711,14:POKE 708,50:POKE 710,
30:POKE 712,2
2980 ? #6;"{";:POSITION 0,0:POKE 756,P
EEK(106)+1:GOTO 2610
2990 REM ■■■ ENTER CASE POS. ■■■
3000 RESTORE 3100:T=1:NM=1
3010 E=INT(RND(0)*2)+1:IF E=1 THEN REA
D X,Y
3020 READ X,Y:IF X=-1 THEN GOTO 3050
3030 X(T)=X:Y(T)=Y:IF E=2 THEN READ X,
Y
3040 T=T+1:GOTO 3010
3050 E=INT(RND(0)*5)+1:RESTORE (E*10)+
3120
3060 FOR T=1 TO NB
3070 READ X:E=T*2:P(E-1)=X(T):P(E)=Y(T
)
3080 S(T)=X:NEXT T
3090 RETURN :GOTO 110
3100 DATA 10,3,15,6,10,1,15,9,15,4,7,9
3110 DATA 13,5,4,3,16,5,5,6,4,4,14,6
3120 DATA 11,6,18,7,-1,0,-1,0
3130 DATA 5,1,4,2,7,3,6
3140 DATA 6,2,5,1,3,4,7
3150 DATA 3,5,4,1,2,7,6
3160 DATA 4,3,5,7,6,1,2
3170 DATA 6,7,2,5,3,1,4
3180 DIM P0$(8),P1$(8),P2$(8),A$(2),BU
G(5),Z$(8),PMMOV$(100),X(NB),Y(NB),P(N
B*2),S(NB),D1$(8),D2$(8),LGO$(20)
3190 DIM LG2$(20)
3200 GOSUB 3330:RESTORE 3750:POKE 712,
126
3210 LGO$="======[\]^)?@=======":LG2$=
"======[\]^)?@======="
3220 MOVE=ADR(PMMOV$):FOR X=1 TO 100:R
EAD N:PMMOV$(X)=CHR$(N):NEXT X
3230 FOR I=1 TO 8:READ N:P0$(I)=CHR$(N
):NEXT I
3240 FOR I=1 TO 8:READ N:P1$(I)=CHR$(N
):NEXT I
3250 FOR I=1 TO 8:READ N:P2$(I)=CHR$(N
):NEXT I
3260 FOR I=1 TO 8:READ N:Z$(I)=CHR$(N)
:NEXT I
3270 FOR I=1 TO 8:READ N:D1$(I)=CHR$(N
):NEXT I
3280 FOR I=1 TO 8:READ N:D2$(I)=CHR$(N
):NEXT I
3290 PMBASE=INT((PEEK(145)+3)/4)*4:POK
E 54279,PMBASE:PMB=PMBASE*256:PMD=ADR(
P0$):POKE 53277,3
3300 POKE 704,62:POKE 705,46
3310 PMC=ADR(P1$):PME=ADR(P2$):Z=ADR(Z
$):D1=ADR(D1$):D2=ADR(D2$)
3320 GOTO 100
```

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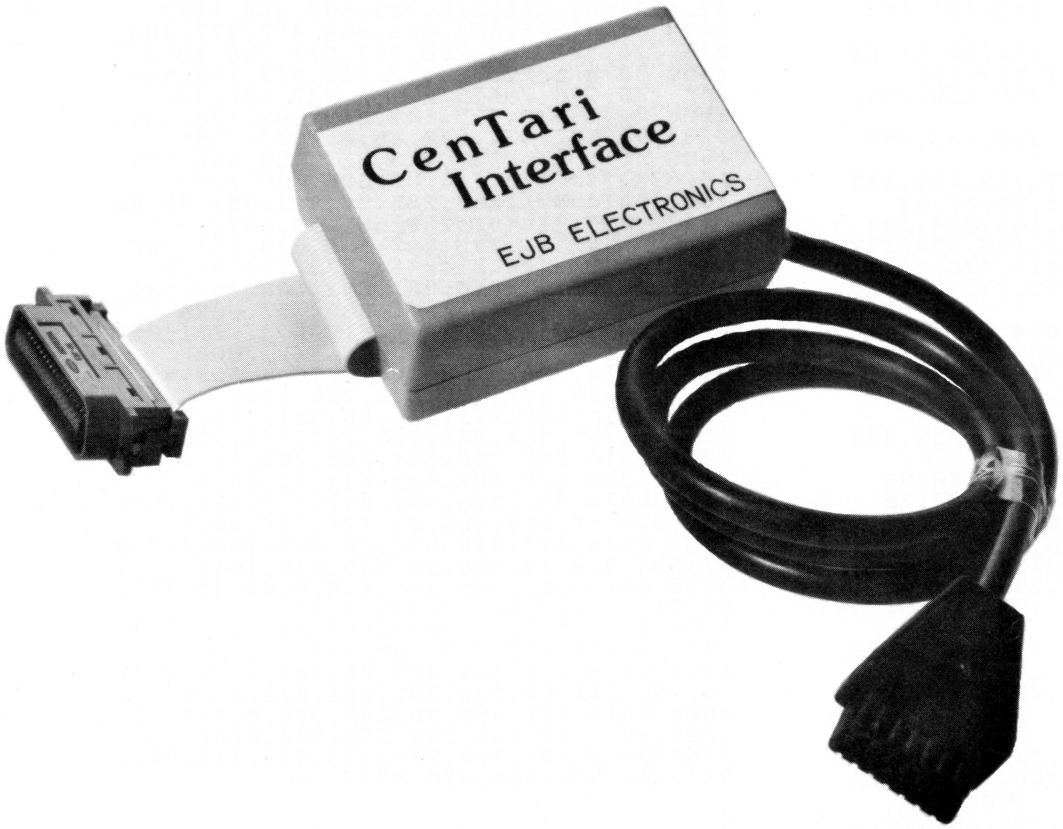

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CIRCLE #141 ON READER SERVICE CARD

```
3330 POKE 106,PEEK(106)-5:START=(PEEK(
106)+1)*256:POKE 756,START/256:POKE 75
2,1
3340 RESTORE 4000:DIM XFR$(38):FOR Y=1
 TO 38:READ Z:XFR$(Y,Y)=CHR$(Z):NEXT Y
3350 Z=USR(ADR(XFR$)):RESTORE 3390:X=2
32-8:READ Z
3360 IF Z=-1 THEN RESTORE :RETURN
3370 FOR Y=0 TO 7:POKE X+Y+START,Z:REA
D Z:NEXT Y:X=X+8
3380 GOTO 3360
3390 DATA 0,192,118,63,112,192,0,0
3400 DATA 0,0,0,0,0,0,255,255
3410 DATA 0,0,199,207,205,207,237,237
3420 DATA 0,0,59,187,191,191,183,183
3430 DATA 0,0,120,96,112,96,127,127
3440 DATA 255,255,255,255,255,255,255,
255
3450 DATA 255,17,255,136,255,17,255,13
6
3460 DATA 255,255,55,21,21,5,5,1
3470 DATA 255,255,255,247,245,181,181,
144
3480 DATA 255,246,244,244,112,80,64,64
3490 DATA 1,7,23,23,55,127,127,255
3500 DATA 164,173,253,255,255,255,255,
255
3510 DATA 128,136,168,232,248,250,250,
255
3520 DATA 195,199,46,30,62,125,251,199
3530 DATA 192,226,113,53,9,21,67,63
3540 DATA 56,56,16,56,146,186,214,254
3550 DATA 3,71,142,172,144,168,194,252
3560 DATA 24,24,24,24,60,126,126,102
3570 DATA 60,60,255,255,255,255,255,25
5
3580 DATA 192,64,112,16,28,4,7,1
3590 DATA 24,48,24,48,24,48,24,48
3600 DATA 3,2,14,8,56,32,224,128
3610 DATA 255,146,255,146,255,146,159,
159
3620 DATA 255,73,255,73,255,73,255,255
3630 DATA 2,6,6,31,22,22,18,56
3640 DATA 56,68,130,146,130,68,56,56
3650 DATA 64,96,96,248,104,104,72,28
3660 DATA 16,74,84,137,100,146,84,40
3670 DATA 84,96,170,85,178,41,38,20
3680 DATA 0,60,36,255,255,255,255,0
3690 DATA 0,0,0,0,0,0,255,255
3700 DATA 127,255,192,254,127,3,255,25
4
3710 DATA 0,115,123,107,121,112,96,96
3720 DATA 0,48,48,240,224,192,192,192
3730 DATA 252,254,198,254,252,192,192,
192
3740 DATA -1
3750 DATA 216,104,104,104,133,213,104,
24,105,2,133,206,104,133,205,104,133,2
04,104,133,203,104,104,133,208
3760 DATA 104,104,133,209,104,104,24,1
01,209,133,207,166,213,240,16,165,205,
24,105,128,133,205,165,206,105
3770 DATA 0,133,206,202,208,240,160,0,
162,0,196,209,144,19,196,207,176,15,13
2,212,138,168,177,203,164
3780 DATA 212,145,205,232,169,0,240,4,
169,0,145,205,200,192,128,208,224,166,
213,165,208,157,0,208,96
3790 DATA 0,192,118,63,112,192,0,0
3800 DATA 0,3,110,252,14,3,0,0
3810 DATA 24,24,24,24,60,126,126,102
3820 DATA 0,0,0,0,0,0,0,0
3830 DATA 0,192,118,37,8,0,0,0
3840 DATA 0,0,20,55,112,192,0,0
4000 DATA 104,169,0,133,203,133,205,16
9,224,133,206,165,106,24,105,1,133,204
,160,0,177,205,145,203,200,208
4010 DATA 249,230,204,230,206,165,206,
201,228,208,237,96
```

CHECKSUM DATA

(see page 27)

```
1 DATA 62,334,58,584,70,259,976,412,94
4,518,793,852,842,41,365,7110
150 DATA 731,164,816,62,11,526,116,871
,565,431,714,231,733,28,362,6361
300 DATA 150,81,596,87,719,361,619,794
,976,673,114,663,666,782,977,8258
450 DATA 95,98,101,61,254,950,100,431,
81,414,159,447,813,745,934,5683
600 DATA 84,87,90,953,149,693,700,707,
710,39,947,636,79,283,428,6585
750 DATA 433,442,449,621,108,711,614,6
01,959,903,230,169,173,638,311,7362
900 DATA 52,651,772,987,684,511,997,97
4,661,376,310,310,441,444,461,8631
1050 DATA 941,946,989,450,212,52,804,9
12,151,989,810,215,789,652,440,9352
1200 DATA 579,434,453,460,467,477,484,
213,316,997,889,288,923,832,286,8098
1350 DATA 637,916,917,918,919,125,546,
446,136,778,796,932,965,337,338,9706
1500 DATA 532,819,149,239,505,178,326,
923,882,803,934,292,85,862,27,7556
1650 DATA 446,253,448,837,450,668,606,
14,803,943,378,944,80,596,326,7792
1800 DATA 321,388,285,86,821,681,88,81
0,952,306,92,481,258,65,790,6424
1950 DATA 371,795,842,190,620,153,782,
926,19,815,272,894,864,739,734,9016
2100 DATA 732,688,981,482,688,789,935,
388,1,522,801,732,708,606,373,9426
2250 DATA 652,638,708,8,796,33,791,258
,202,151,177,597,607,443,947,7008
2400 DATA 996,895,795,547,716,164,49,2
92,907,196,1,168,6,187,996,6915
2550 DATA 539,221,206,85,301,326,988,4
22,406,785,984,935,265,741,751,7955
2700 DATA 298,325,614,748,789,74,517,2
83,61,988,370,402,479,611,71,6630
2850 DATA 851,926,692,897,939,111,752,
902,874,47,388,866,22,324,287,8878
3000 DATA 327,426,571,28,485,980,467,8
47,503,930,12,890,94,536,536,7632
3150 DATA 531,540,546,418,6,66,38,727,
82,84,86,717,51,53,394,4339
3300 DATA 540,111,877,567,954,582,709,
377,738,903,92,222,989,757,392,8810
3450 DATA 272,455,385,88,901,382,378,1
15,796,241,67,938,305,452,671,6446
3600 DATA 441,405,96,342,996,8,982,814
,782,107,302,186,269,393,584,6707
3750 DATA 883,970,239,418,915,313,942,
944,338,575,934,825,8296
```

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The ANALOG Card File

16K Disk

by David Plotkin

As I was doing my income taxes this year, I found that I needed a tool to organize and catalog the veritable mountain of receipts. This little utility was just what the doctor ordered. It allows you to type just about anything you want on the screen, save the screen to disk, edit it in the future and print it out for posterity.

The first thing you are presented with is the general menu screen, offering various options: 1. getting a disk directory and purging files from the disk; 2. starting with a new screen; or 3. Editing an old screen. Also on this screen are some brief instructions.

If you choose a new screen, you'll need to specify the filename to store the screen under, then you are presented with a blank lined screen, similar to a 5" × 7" index card. On the first line is the title; this doesn't get printed out when you dump the screen to the printer. Be careful not to scroll the screen, or some of your information will move up into the title area, with some pretty strange-looking results. If you do inadvertently have this problem, you can just RESET and RUN the program again. If you choose to edit an old screen, you'll need to give the filename of the screen, which will then be presented for editing. Press SELECT to print the screen, START to save the screen to disk, and OPTION to start over without saving the screen. The major sections of the program are as follows:

Lines 0-20 — Set up, initialize and modify the display list.

Lines 25-60 — Draw the menu screen with instructions and get the users choice.

Lines 100-120 - The New Screen routine.

Lines 130-160 — Read the keyboard directly from the memory location 764. Also check for pressing of the console buttons (START, SELECT, and OPTION).

Lines 700-720 — Delete a file.

Line 800 — Get the name of the file to edit, then go get it.

Lines 900-960 — The disk directory.

Lines 1000-1030 — Write a screen to disk. The write is done using the fast IOCB routines, which are set up in Lines 1020 and 1030, then called in Line 2030 by the USR call.

Lines 2000-2030 — Read a screen from disk. This routine also uses the high speed IOCB call.

Lines 3000-3010 — Print out the screen. Each character in a line is PEEKed from the screen. The memory address of the beginning of each line is looked up in the array LINE; this is much faster than calculating the address each time. Before the character PEEKed from the screen can be printed, however, it must be translated from Internal Code to ATASCII,

which is what the printer understands. The variable IC is a value of Internal Code. HOLD$ is an array of ATASCII codes in Internal Code order, so looking up HOLD$(IC+1) returns the ATASCII code HOLD$(IC+1). It's pretty fast, too.

Lines 3100-3150 — This section of code fills the array HOLD$ with ATASCII codes in Internal Code order, for use in the printer dump routine.

Lines3200-3260 — Set up the Player/Missile graphics. What Player/Missile graphics? What do you think those nice, thin lines are? They are single-line resolution Player/Missiles, in triple width, butted edge-to-edge to fill the screen. By proper positioning, there is no overlap between the lines and the letters.

I have found this program to be quite useful for keeping records, since I can set up full screens of data in any format I want. □

```
0 REM  ANALOG CARD FILE
1 REM
2 REM : IF NEW SCREEN THEN DRAW A
3 REM : BLANK SCREEN AND PUT THE
4 REM : CURSOR ON THE FIRST LINE.
5 REM
6 REM : IF OLD SCREEN THEN LOAD THE
7 REM : SELECTED SCREEN, GOTO EDITOR,
8 REM : AND SAVE OVER OLD FILE.
9 REM
14 K1=1:K255=255:K256=K255+K1:TRAP 20:
POKE 752,K1:? "{INITIALIZING"
15 DIM A$(K1),FILE$(15),LINE(25),PP$(4
0),HOLD$(K256),FN$(14)
16 SCREEN=PEEK(88)+K256*PEEK(89)+40:FO
R J=K1 TO 23:LINE(J)=SCREEN:SCREEN=SCR
EEN+40:NEXT J:GOSUB 3100
19 REM  MAIN MENU SCREEN
20 TRAP 20:GRAPHICS K0:POKE 559,62:POK
E 53277,3:SETCOLOR 2,K0,K0:GOSUB 30000
:POKE 82,K0
25 ? :? :? "}*** ANALOG CARD FILE ***"
:? :PP$=CHR$(18):PP$(40)=PP$:PP$(2)=PP
$:? PP$
26 ? "AFTER SCREEN IS LOADED, TYPE ON
THE":? "SCREEN AS DESIRED.  START=SAVE
 TO"
27 ? "DISK.  OPTION=START OVER WITHOUT
 SAVING"
28 ? "SELECT=PRINT OUT THE SCREEN.":?
:? PP$
30 ? :? "NEW OR OLD SCREEN, DIRECTORY"
:? "OR PURGE A CARD: ";:CLOSE #K1:OPEN
 #K1,4,K0,"K:":GET #1,J:A$=CHR$(J)
40 IF A$="O" THEN 800
45 IF A$="P" THEN 700
50 IF A$="D" THEN 900
60 IF A$<>"N" THEN 30
99 REM  NEW SCREEN ROUTINE
100 ? "NEW":? :? "FILE NAME TO SAVE AS
";:GOSUB 4000:GRAPHICS K0:POKE 559,62
110 POKE 53277,3:SETCOLOR 2,8,2:SETCOL
OR K1,K0,13:SETCOLOR K0,K1,15:DL=PEEK(
560)+PEEK(561)*K256:GOSUB 30000
120 POKE DL+3,70:POKE DL+6,11:? " ANAL
OG CARD FILE";
129 REM  EDITOR ROUTINE
130 TRAP 20:CLOSE #K1:OPEN #K1,4,K0,"K
:":POKE 82,K0:POKE 752,K0:POSITION K0,
K1:? "}{";:POKE 764,K255
140 IF PEEK(764)<>K255 THEN GET #K1,K:
? CHR$(K);:GOTO 140
150 IF PEEK(53279)=6 THEN POKE 752,K1:
? "{";:GOTO 1000
155 IF PEEK(53279)=3 THEN 20
156 IF PEEK(53279)=5 THEN 3000
160 GOTO 140
699 REM  DELETE A FILE
700 ? "PURGE":? :CLOSE #K1:? "ENTER FI
LENAME TO DELETE OR PRESS":? "RETURN T
O ABORT";:GOSUB 4000
710 IF FN$="" THEN 20
720 XIO 33,#3,K0,K0,FILE$:GOTO 20
799 REM  EDIT SCREEN ROUTINE
800 ? "OLD":? :? "FILE NAME TO EDIT";:
GOSUB 4000:GOTO 2000
899 REM  DISK DIRECTORY
900 ? "DRIVE #";:GET #K1,X:FN$="D1:*.
*":FN$(2,2)=CHR$(X):CLOSE #K1:? CHR$(X
):? :OPEN #K1,6,K0,FN$
910 FOR X=K1 TO 64:INPUT #K1,FN$:FN$=F
N$(3):IF FN$(3,12)="FREE SECTO" THEN 9
45
920 IF X/2=INT(X/2) THEN POSITION 15,(
X+K1)/2:? FN$:GOTO 940
930 POSITION 2,(X+2)/2:? FN$
940 NEXT X
945 ? :? "PRESS ANY KEY TO CONTINUE...
";:POKE 764,K255
950 IF PEEK(764)=K255 THEN 950
960 POKE 764,K255:CLOSE #K1:GOTO 20
999 REM  WRITE SCREEN TO DISK
1000 CLOSE #K1:OPEN #K1,8,K0,FILE$
1010 PUT #K1,PEEK(939):FOR I=708 TO 71
2:PUT #K1,PEEK(I):NEXT I
1020 RAMTOP=PEEK(106)*K256:DL=PEEK(560
)+K256*PEEK(561):BYTES=RAMTOP-DL:HI=IN
T(BYTES/K256):LO=BYTES-HI*K256
```

(continued on page 86)

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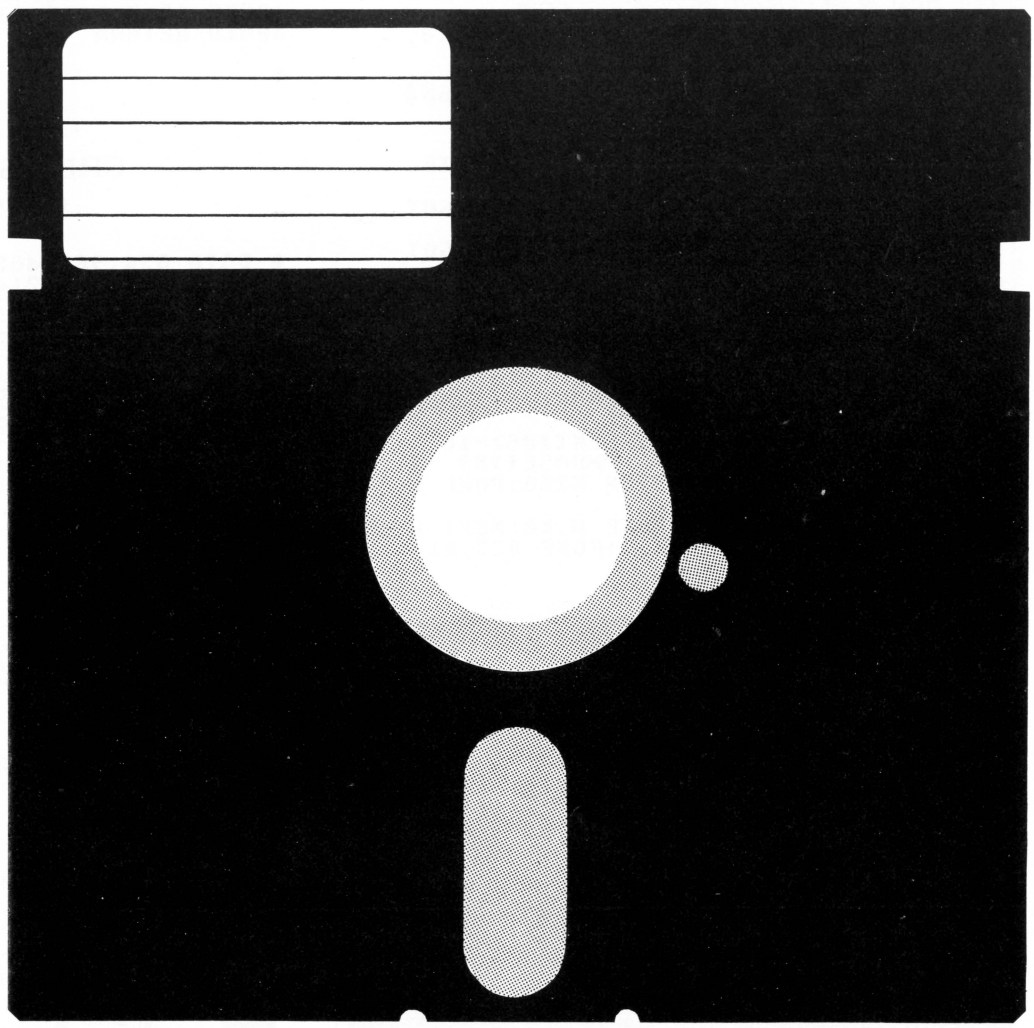

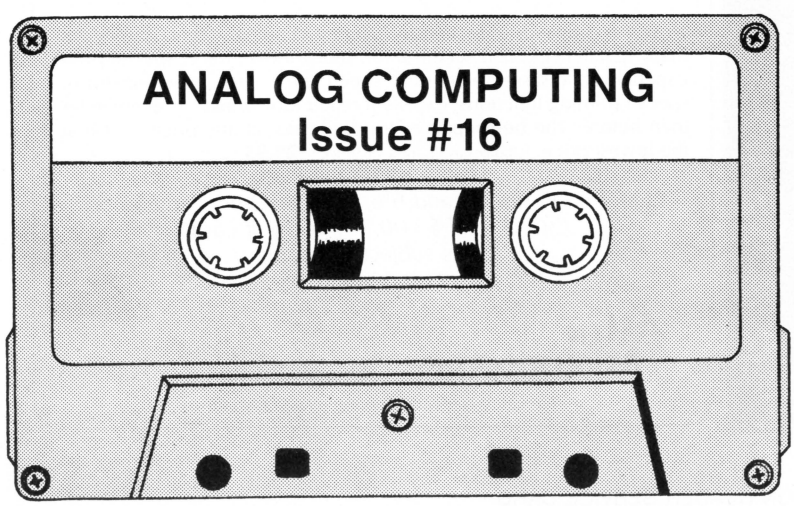

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```
1030 POKE 850,11:POKE 856,LO:POKE 857,
HI:GOTO 2030
1999 REM [READ SCREEN FROM DISK]
2000 CLOSE #K1:OPEN #K1,4,K0,FILE$
2010 GET #K1,A:GRAPHICS A:POKE 559,62:
POKE 53277,3:FOR I=708 TO 712:GET #K1,
A
2020 POKE I,A:NEXT I:GOSUB 30000:POKE
850,7:POKE 856,K255:POKE 857,K255
2030 POKE 852,PEEK(560):POKE 853,PEEK(
561):X=USR(ADR("hhh[LV]"),16):CLOSE #1
:GOTO 130
2999 REM [PRINT OUT THE SCREEN]
3000 TRAP 130:CLOSE #K1:OPEN #K1,8,K0,
"P:":FOR J=K1 TO 23
3010 FOR I=K1 TO 40:PP$(I)=HOLD$(PEEK(
LINE(J)+I-K1)+K1):NEXT I:PRINT #K1;PP$
:NEXT J:CLOSE #K1:GOTO 130
3099 REM [ARRAY TO MAKE IC TO AC]
3100 FOR II=K0 TO K255:IC=II:IV=K0:IF
IC>127 THEN IV=K1:IC=IC-128
3110 IF IC<64 THEN AC=IC+32+128*IV:GOT
O 3140
3120 IF IC<96 THEN AC=IC-64+128*IV:GOT
O 3140
3130 AC=IC+128*IV
3140 HOLD$(II+K1)=CHR$(AC):NEXT II
3199 REM [P/M INITIALIZATION]
3200 PMBASE=PEEK(106)-16:POKE 54279,PM
BASE:PMBASE=PMBASE*K256
3210 FOR W=53256 TO 53259:POKE W,3:NEX
T W:POKE 53260,K255
3220 POKE 88,K0:POKE 89,PEEK(106)-16
3230 FOR W=PMBASE+809 TO PMBASE+989 ST
EP 8:FOR J=K0 TO 1024 STEP K256:POKE W
+J,K255:NEXT J:NEXT W
3240 FOR W=704 TO 707:POKE W,K0:NEXT W
:POKE 559,62:POKE 53277,3:POKE 623,K1
3250 FOR I=53248 TO 53255:READ J:POKE
I,J:NEXT I:RETURN
3260 DATA 48,80,112,144,176,184,192,20
0
3999 REM [FILE NAME HANDLER]
4000 INPUT FN$:IF FN$="" THEN RETURN
4010 FOR J=K1 TO LEN(FN$):IF FN$(J,J)=
":" THEN FILE$=FN$:RETURN
4020 NEXT J:FILE$="D:":FILE$(3)=FN$:RE
TURN
29999 REM [DISABLE BREAK KEY]
30000 U=PEEK(16):IF U>127 THEN U=U-128
:POKE 16,U:POKE 53774,U
30010 RETURN
```

●

CHECKSUM DATA

(see page 27)

```
0 DATA 854,987,465,241,702,995,615,302
,260,3,508,874,214,229,790,8039
25 DATA 436,318,575,582,603,712,728,68
3,526,15,389,7,607,425,558,7164
140 DATA 958,403,693,738,713,830,564,5
48,14,330,266,420,338,467,628,7910
930 DATA 769,786,6,849,540,748,337,789
,57,990,268,331,426,725,214,7835
2999 DATA 21,853,992,562,105,145,168,1
28,319,151,136,16,481,609,426,5112
3250 DATA 978,265,761,24,16,603,741,61
3,46,4047
```

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The ANALOG Printer Survey

by Michael DesChenes

This printer overview is limited to the more popular dot-matrix printers, which we feel deserve your first consideration when shopping for a printer. Most of the companies have higher and lower end models, but we'll stick with the models shown, because of their popularity and dependability.

I hate to admit this, but I almost forgot to include the Atari 1025 printer in the comparison chart. Being an Atari-exclusive magazine, we felt that it *should* be included. Don't get me wrong — it's a good heavy-duty general printer (actually, it's an Okidata 80), but I've been spoiled with printers offering more features.

As the chart shows, all but one of the printers use a nine-wire print head, and, unless you're looking for a near-letter quality printer with the ability to do graphics and general printouts, the nine-wire print heads are fine.

As far as the print speed, **ANALOG** uses both the Epson RX80 and C.Itoh Prowriter. . .and the slower Epson doesn't cause anyone to pace the floor in anticipation. So don't feel that speed should be your major concern (speed is slower in enhanced or letter quality modes).

Because printers are usually a lot slower than computers, a printer buffer is a nice feature. The print buffer is essentially memory that resides between the computer and printer. The buffer takes the information that is sent from the computer and sends it to the printer, according to the printer's speed limitation. With some of the larger optional buffers (up to 32K), this can leave the computer free to do other things while the printer is still at work.

Varying print modes (i.e., double width, emphasized, compressed, etc.) will have a direct effect on the print size, which is measured in characters per inch, and the number of characters per column. For example, the Epson's smallest type, compressed, can fit 137 characters per line. The matrix listed for each printer is for that printer's normal character, not its expanded or compressed type (see Figure 1).

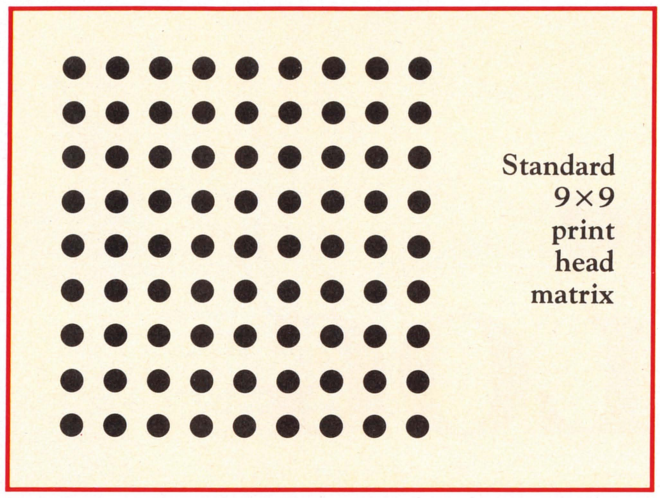

Figure 1.

If the printer has other print modes or graphics capabilities, that matrix is shown on the chart in the graphics column. All printers have the standard ASCII character set and international symbols. A few may have italics, Greek, Japanese or other optional languages and symbols. If you'll be using your printer for correspondence, I'd recommend at least having italics, if no other fonts.

Two of the printers have a nice feature that can save you some money. They plug directly into the Atari without the use of an interface. If you don't already have an interface and don't intend to buy one (perhaps you're saving up for a modem), then this can be a substantial savings. If you are planning on buying an interface, I would suggest that you look at some of the third-party ones available. They are usually less expensive and easier to find than the Atari 850.

Several years ago, reliability of printer mechanisms was a major concern. Today, however, most printers use high-reliability parts and virtually never break down. The Epson and C.Itoh printers in the **ANALOG** offices have been cranking out listings for over three years without any serious breakdowns. It's always better to play it safe, though, so it's a good idea to find out where the nearest repair facility is for the printer you're thinking of buying.

As you may have noticed, this is more of an overview of the more popular Atari-compatible printers — not a review. However, we picked only the printers that we would highly recommend. Don't be frightened by the prices. These are the suggested retail, and you'll more than likely find them at discount prices. Depending on your needs, you'll be happy with any one of these printers. □

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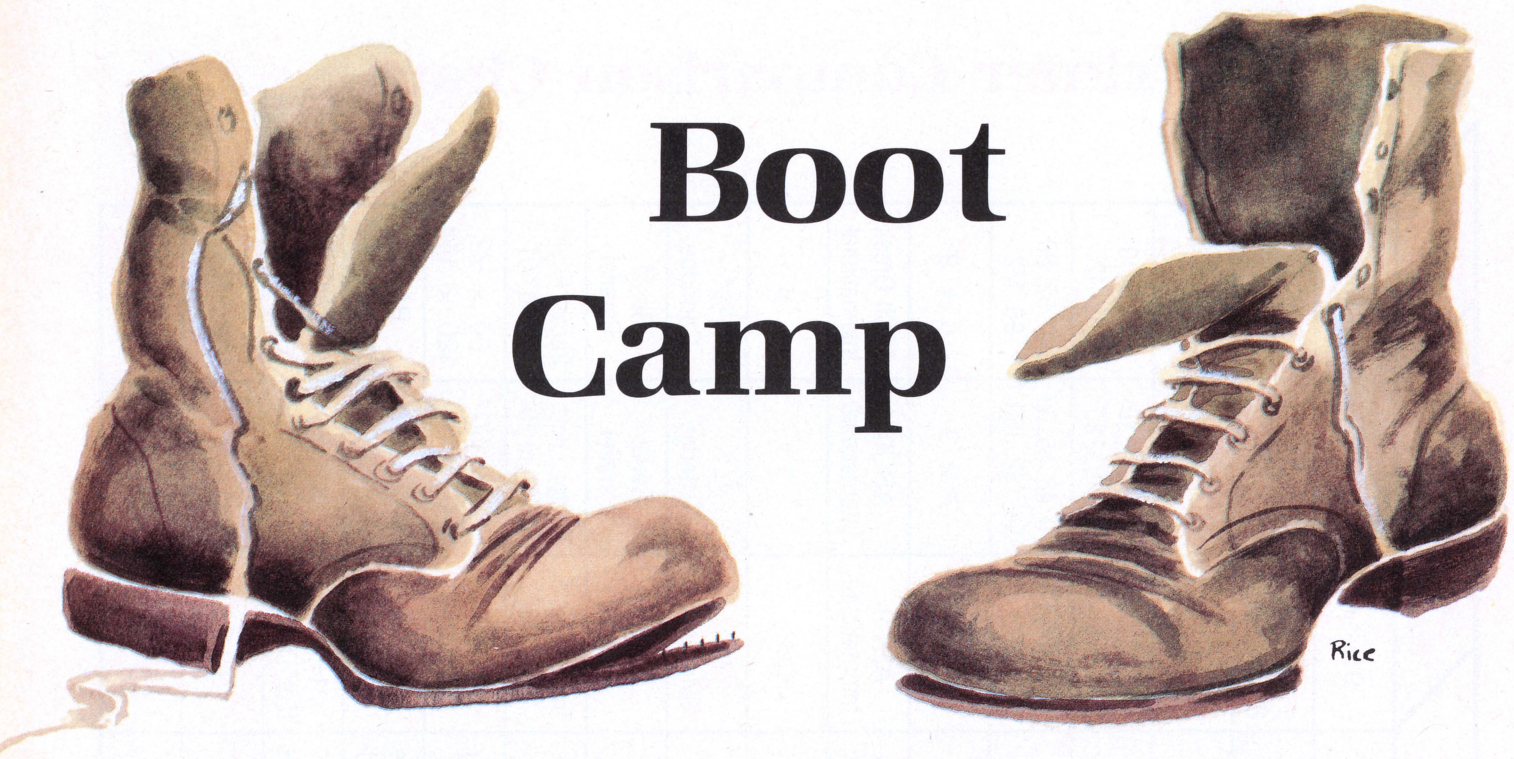
Printer Comparison Chart

	ATARI 1025	AXIOM GP-700AT	GEMINI 10X	EPSON RX-80FT	NEC 8023A	OKIDATA 82A	MANNESMANN Tally 160	C.ITOH Prowriter
Print Head	9 wire	Hammer 4-Heads	9 wire	9 wire	9 wire	9 wire	9 wire	9 wire
Maximum Print Speed	40 cps	86 cps	160 cps Bi-Directional	100 cps Bi-Directional	120 cps	120 cps Bi-Directional	160 cps	180 cps
Buffer Size	None	1K	8K Optional	None	2K	2K Optional	2K	2K
Print Size CPI	5, 10, 16	10, 13.3	5, 6, 8.5 10, 12, 17	5, 6, 8.5 10, 12, 17	5, 6, 8.5 10, 12, 17	5, 8.3, 10, 16.5	5, 6, 8.2, 10 12, 16.5, 20	5, 6.5, 10 12, 17
Characters Per Column	40, 80, 128	80, 106	40, 48, 68 80, 96, 136	40, 48, 68, 80, 96, 137	40, 48, 68 80, 96, 136	40, 66.4, 80 132	40, 48, 65, 80 96, 132, 160	40, 52, 80 96, 132
Standard Print Matrix	9 × 7	7 × 8	9 × 9	9 × 9	8 × 8	9 × 9	7 × 9	8 × 9
Character Sets	ASCII International	ASCII International	ASCII Italics International	ASCII Italics International	ASCII Italics International	ASCII International	ASCII International	ASCII Greek International
No. of Fonts	1	1	8	5	4	1	1	6
Ribbon Type	½″ Twin Spools	4-Color Cartridge	2″ Twin Spools	⅜″ Cartridge	½″ Cartridge	½″ Twin Spools	⅜″ Cartridge	⅜″ Cartridge
Interface	Directly to Serial Port	Directly to Serial Port	Serial Parallel	Serial Parallel	Serial	Serial Parallel	Serial Parallel	Serial Parallel
Paper Type & Size	Tractor Frictn. 3″ to 9.5″	Tractor Frictn. 3″ to 10″	Tractor Frictn. Roll 3″ to 10″	Tractor Frictn. 4″ to 10″	Tractor Frictn. 4.5″ to 10″	Tractor Frictn. 3″ to 9.5″	Tractor Frictn. Roll 3″ to 10″	Tractor Frictn. 3″ to 10″
Graphics Matrix	None	80 × 80	60 × 72 120 × 144 240 × 144	60 × 72 120 × 144 240 × 144	160 × 144	60 × 65 Optional	64 × 50 64 × 100	60 × 72 120 × 144
Extra Features	*No interface needed	4-Color w/Software	*No interface needed		True underline Reverse Feed		Near letter quality	RAM Character Set
Dimensions	13.3″W 9.6″D, 4.2″H	17″W 12.5″D, 4.5″H	21.3″W 12.4″D, 5.3″H	14.5″W 11.8″D, 5.2″H	15.4″W 11.1″D, 4.7″H	14.2″W 12.9″D, 5.2″H	13.7″W 9.6″D, 6.2″H	15.5″W 11.1″D, 5.3″H
Weight	13.2 lbs.	13.2 lbs.	23.8 lbs.	13.4 lbs.	18.7 lbs.	19.6 lbs.	17 lbs.	18.7 lbs.
Suggested Retail Price	$549.00	$599.00	$649.00	$499.00	$645.00	$349.00	$698.00	$755.00



Boot Camp

by Tom Hudson

Well, for the last week or so I've been receiving your solutions to the 5 times 27 multiply problem, and it looks like everybody's got the hang of it. Some people tried to cheat by multiplying 27 by 5. This is a much simpler operation, but we'll see later why this type of shortcut is not always possible.

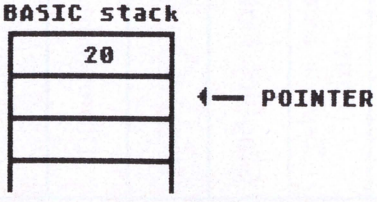
What happened?!!

Figure 6 from last issue's column was a simple BASIC program that looked like this:

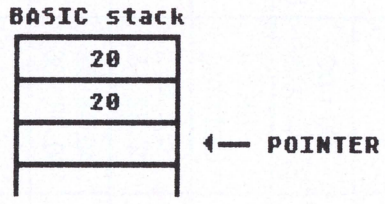
```
10 GOSUB 10
20 END
```

I told you to execute it and see if you could determine what went wrong. If you look at the code, you'll see that the program places itself in an infinite loop with the GOSUB 10 statement. If you let the program run for a few minutes, you'll eventually see an ERROR 2 message. What happened? Let's step through the program and find out.

Line 10 executes a GOSUB 10 statement. The next executable statement is Line 20, so the line number 20 is placed on the stack. The program then branches to Line 10. The stack now looks like this:



Line 10 executes GOSUB 10 again, with the same results as above. The line number 20 is placed on the stack *again*, and execution continues at Line 10 again. Now the stack looks like this:



Line 10 performs the same set of operations again, and you can see that the program is in an infinite loop. Each time the GOSUB 10 statement is executed, the BASIC stack gets larger and larger. . .until there is no more memory available. When this happens, the computer stops with the ERROR 2 AT LINE 10 message.

Obviously, one must take care that all subroutines are terminated by a RETURN. Each subroutine must contain at least one RETURN statement, otherwise you'll find yourself running out of memory far faster than you ever dreamed!

Assembly subroutines.

Last issue, as you recall, we found out what a stack is and how BASIC uses a stack to execute subroutines. There is a lot of "housekeeping" done by the system to keep track of subroutines, and we don't want to

write all those routines ourselves, do we?

Luckily for us, the 6502 microprocessor has its own set of subroutine instructions. They are: JSR (jump to subroutine), which corresponds to the BASIC GOSUB statement; and RTS (return from subroutine), which performs the same function as the BASIC RETURN statement.

The format of the JSR instruction is:

JSR nn (ABSOLUTE)

The operand of the JSR instruction can be any address, such as JSR $4000, or a program label, such as JSR PRINT.

When the JSR instruction executes, things happen a little differently than they did in our BASIC example, last issue. Instead of a line number being placed on the stack, a two-byte address is used. More on that in a moment.

The format of the RTS instruction is:

RTS

Like the RETURN statement in BASIC, the RTS instruction will continue execution at the instruction following the JSR which called the subroutine.

Let's look at an assembly program which uses the JSR and RTS instructions. For purposes of illustration, we'll duplicate the function of the BASIC program we used last time. Figure 1 is a listing of the assembly program, with the addresses and hex codes of the instructions shown to the left of the line numbers. The corresponding BASIC statements are shown in the comment fields.

```
0000          10          *=    $0600
0600 D8       15          CLD
0601 200506   20          JSR   SUB1      ;GOSUB 100
0604 00       25          BRK             ;END
0605 200906   30 SUB1     JSR   SUB2      ;GOSUB 200
0608 60       35          RTS             ;RETURN
0609 AD1306   40 SUB2     LDA   VARA      ;VARA=VARA+1
060C 18       45          CLC
060D 6901     50          ADC   #1
060F 8D1306   55          STA   VARA
0612 60       60          RTS             ;RETURN
0613          65 VARA     *=    *+1
0614          70          .END
```

Figure 1.

Let's walk through this program and watch what happens to the stack. Remember, the 6502 does all the stack handling for us, and this walk-through is just to familiarize you with what's happening inside the machine.

Line 15 clears the decimal mode for the binary arithmetic the program will do later. At the start of the program, the stack pointer will be at some arbitrary location. We'll assume that it's set to $00 for this demonstration. The stack at this point looks like this:

(continued on next page)

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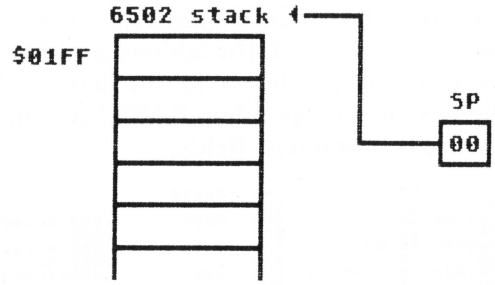
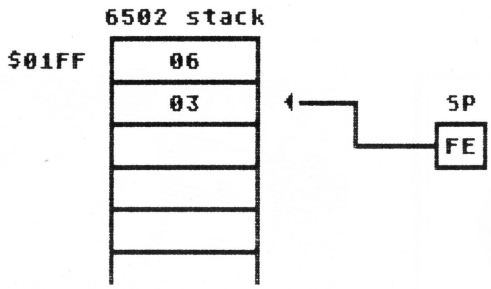
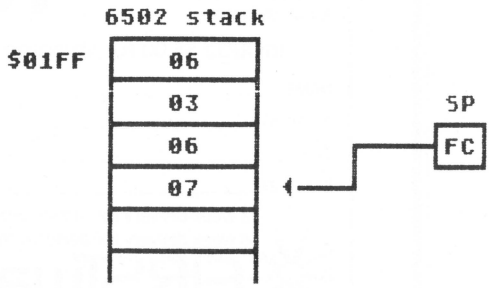


Line 20 performs a JSR to the location labeled SUB1. Before going to the subroutine, the 6502 must save the return address on the stack. The next instruction after the JSR is at $0604, so the 6502 takes this address and *subtracts 1* from it, resulting in a return address of $0603. The stack pointer is decremented by 1, and contains $FF. The high byte of the return address ($06) is placed at location $01FF. The stack pointer is decremented again, and now contains $FE. Now the 6502 stores the *low* byte of the return address ($03) on the stack at location $01FE. The return address is now properly stored, and execution continues at location $0605, the address of SUB1. At this point, the stack looks like this:

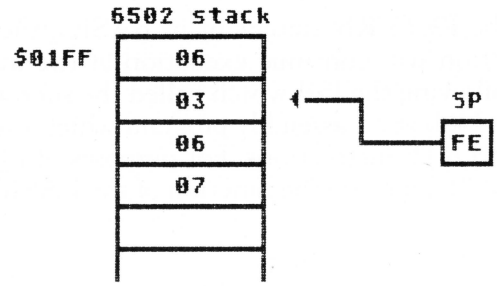


Line 30 — Execution continues here after the JSR process is complete. This is another JSR, this time to the subroutine labeled SUB2. As in the previous JSR, the return address minus 1 ($0607 this time) is stored in the next two stack locations, and execution continues at the subroutine. The stack pointer now contains $FC, and the stack looks like this:

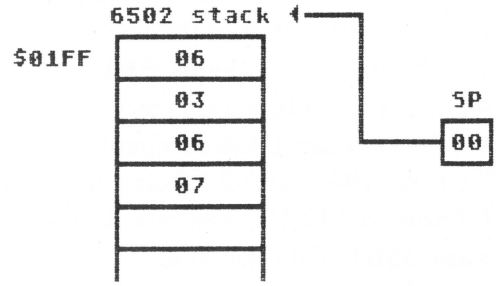


Lines 40 - 55 add 1 to the contents of location VARA, placing the result back into VARA. The stack is unchanged by this operation.

Line 60 — Now we encounter our first RTS instruction. It functions almost like the BASIC RETURN statement, but with a small difference. When executed, the RTS gets the byte from the stack location indicated by the stack pointer and places it in the *low* byte of the program counter. Remember that the program counter is where the 6502 stores the address of the instruction that is currently being executed. The stack pointer is then incremented (to $FD), the next byte in the stack is placed in the *high* byte of the program counter, and the stack pointer is incremented again (to $FE). At this point, the program counter contains the return address minus 1, so the program counter is incremented by 1 to get the proper return address. In this case, the return address is $0608, and the program continues there (Line 35). After this instruction executes, the stack will look like this:



Line 35 executes another RTS instruction. This time, the program will return to location $0604 (1 byte higher than the location in the last two bytes of the stack). The stack pointer will be incremented twice, and when the program is complete, the stack pointer will contain $00. After this RTS, execution continues at Line 25, and the stack looks like this:



Line 25 stops the execution of the program with the BRK instruction. The stack is unchanged.

Don't panic!

Remember, the 6502 performs all of the stack maintenance functions for you. Writing a subroutine in assembly is just as easy as writing one in BASIC. I've just explained the details of the stack, so that you'll be prepared for next issue's stack-manipulation instructions.

Later on, when you're more comfortable with assembly language and the stack, we'll see how we can use the stack for some fancy control structures.

Simple subroutines.

Right now, let's see how simple assembly subroutines can be. Let's write a subroutine that will add 1 to a two-byte counter for us.

Let's assume the counter is labeled COUNTL (low byte) and COUNTH (high byte). The normal code we'd use to add 1 to this two-byte counter is shown in Figure 2.

```
LDA COUNTL      ;GET LO BYTE
CLC             ;CLEAR CARRY
ADC #1          ;ADD 1
STA COUNTL      ;SAVE LO BYTE
LDA COUNTH      ;GET HI BYTE
ADC #0          ;ADD WITH CARRY
STA COUNTH      ;SAVE HI BYTE
```

Figure 2.

Clearly, this is just a simple two-byte add operation (if you have problems with addition, review issue 17's **Boot Camp**).

Let's say you're writing a program which needs to increment this counter in several different places. You could re-type the addition code each time you need it, but this would waste quite a bit of memory. Luckily, you know all about the 6502 JSR and RTS instructions, so you write a simple subroutine to do the job. Figure 3 shows the code necessary.

```
INCCTR LDA COUNTL  ;GET LO BYTE
       CLC         ;CLEAR CARRY
       ADC #1      ;ADD 1
       STA COUNTL  ;SAVE LO BYTE
       LDA COUNTH  ;GET HI BYTE
       ADC #0      ;ADD W/CARRY
       STA COUNTH  ;SAVE HI BYTE
       RTS         ;RETURN!
```

Figure 3.

If you look at the subroutine closely, you'll see only *two* changes from Figure 1! The first line of the subroutine contains the label INCCTR (INCrement CounTeR). This allows us to reference the subroutine with an easy-to-remember name. The other change is the addition of an RTS instruction at the end of the routine. See? Writing assembly subroutines isn't so hard, after all.

To call this subroutine, all we need is the statement:

```
JSR INCCTR
```

I'm sure you'll agree that this is much easier than retyping the addition code each time you need to increment the counter. Figure 4 shows a complete program which uses the subroutine in three places.

```
10          *=  $0600
20          CLD         ;BINARY MATH
30          LDA #0      ;ZERO OUT...
40          STA COUNTL  ;COUNTER LO
50          STA COUNTH  ;COUNTER HI
60          JSR INCCTR  ;INC COUNTER
70          LDX #4      ;5 TIMES...
80 LOOP1    JSR INCCTR  ;INC COUNTER
90          DEX         ;NEXT X
0100        BPL LOOP1   ;LOOP IF POS.
0110        LDA #$50    ;GET # IN ACC.
0120        JSR INCCTR  ;INC COUNTER
0130        STA ACCUM   ;SAVE ACCUM.
0140        BRK         ;ALL DONE!
0150 INCCTR LDA COUNTL  ;GET LO BYTE
0160        CLC         ;CLEAR CARRY
0170        ADC #1      ;ADD 1
0180        STA COUNTL  ;SAVE LO BYTE
0190        LDA COUNTH  ;GET HI BYTE
0200        ADC #0      ;ADD W/CARRY
0210        STA COUNTH  ;SAVE HI BYTE
0220        RTS         ;RETURN!
0230 COUNTL *=*+1
0240 COUNTH *=*+1
0250 ACCUM  *=*+1
0260        .END
```

Figure 4.

Line 20 clears the decimal mode for binary arithmetic.

Lines 30 - 50 set the counter (COUNTL and COUNTH) to zero.

Line 60 increments the counter using the JSR INCCTR instruction.

Lines 70 - 100 increment the counter five times using the X register as a loop counter. The count starts at 4, and the routine loops back to LOOP1 until the X register is less than zero.

Line 110 loads the accumulator with $50.

Line 120 JSR's to INCCTR to increment the counter a final time.

Line 130 stores the contents of the accumulator at the location labeled ACCUM. Note that this will *not* be the value $50 loaded in Line 110, but will be whatever value the subroutine left there! This is an important point: You must remember which registers are altered by a subroutine, because the values in those registers will be lost when the subroutine is called! In this case, only the accumulator is used by the subroutine, so the X and Y registers can be used without concern.

Line 140 stops the program with the BRK instruction. At this point, you can examine the counter (COUNTL and COUNTH) and see that it contains the value $0007. The location ACCUM will contain $00, not the value $50 loaded in Line 110.

Lines 150 - 220 are the INCCTR subroutine.

Flexible subroutines.

The INCCTR subroutine showed how a subroutine could be written to perform the same function each time. Now we're going to write a subroutine that will perform a function on a value passed to the subroutine in one of the registers. We'll use another familiar routine, multiplication by 27.

We'll write a subroutine which will multiply the contents of the accumulator by 27 and return with the value times 27 in the accumulator.

Those people who took the multiply 27 by 5 shortcut are in for a little surprise! In order for this subroutine to work, the multiply by 27 approach *must* be used. Take that!

Figure 5 shows the subroutine necessary to multiply the accumulator by 27 and return the result in the accumulator. Only the accumulator is altered; the X and Y registers are untouched. The subroutine requires three one-byte storage locations, TIMES1, TIMES2 and TIMES8.

```
MULT27 STA TIMES1 ;SAVE NUMBER
       ASL A      ;* 2
       STA TIMES2 ;SAVE # TIMES 2
       ASL A      ;* 4
       ASL A      ;* 8
       STA TIMES8 ;SAVE # TIMES 8
       ASL A      ;* 16
       CLC        ;CLEAR CARRY
       ADC TIMES8 ;*16 + *8 = *24
       CLC        ;CLEAR CARRY
       ADC TIMES2 ;*24 + *2 = *26
       CLC        ;CLEAR AGAIN
       ADC TIMES1 ;*26 + *1 = *27
       RTS        ;ALL DONE!
```

Figure 5.

This routine is essentially the same as the multiply by 27 solution shown last issue. The accumulator is assumed to contain the number to be multiplied upon entry into the subroutine. After the multiply is complete, the result is left in the accumulator. The RTS instruction at the end of the routine lets us know that this is a subroutine. The subroutine is labeled MULT27 and is called with the statement:

```
JSR MULT27
```

Let's put this subroutine to work, using a program which will multiply the numbers 3, 7 and 9 by 27. We will place the results in locations labeled THREE, SEVEN and NINE, respectively. Figure 6 shows one possible solution.

```
10          *=  $0600
20          CLD         ;BINARY MATH
30          LDA #3      ;GET 3,
40          JSR MULT27  ;MULT BY 27,
50          STA THREE   ;SAVE RESULT
60          LDA #7      ;GET 7,
70          JSR MULT27  ;MULT BY 27,
80          STA SEVEN   ;SAVE RESULT
90          LDA #9      ;GET 9,
0100        JSR MULT27  ;MULT BY 27
0110        STA NINE    ;SAVE RESULT
0120        BRK         ;AND STOP!
0130 MULT27 STA TIMES1  ;SAVE NUMBER
0140        ASL A       ;* 2
0150        STA TIMES2  ;SAVE # TIMES 2
0160        ASL A       ;* 4
0170        ASL A       ;* 8
0180        STA TIMES8  ;SAVE # TIMES 8
0190        ASL A       ;* 16
0200        CLC         ;CLEAR CARRY
0210        ADC TIMES8  ;*16 + *8 = *24
0220        CLC         ;CLEAR CARRY
0230        ADC TIMES2  ;*24 + *2 = *26
0240        CLC         ;CLEAR AGAIN
0250        ADC TIMES1  ;*26 + *1 = *27
0260        RTS         ;ALL DONE!
0270 TIMES1 *=*+1
0280 TIMES2 *=*+1
0290 TIMES8 *=*+1
0300 THREE  *=*+1       ;3*27 RESULT
0310 SEVEN  *=*+1       ;7*27 RESULT
0320 NINE   *=*+1       ;9*27 RESULT
0330        .END
```

Figure 6.

Line 20 clears the decimal mode for binary arithmetic.

Line 30 places the number 3 in the accumulator, so that it can be multiplied by 27.

Line 40 performs a JSR to the subroutine MULT27, which multiplies the accumulator by 27. The result of the multiply will be in the accumulator when the subroutine is finished.

Line 50 stores the contents of the accumulator in the location THREE. This is the value 3*27.

Lines 60 - 80 multiply the number 7 by 27 and place the result in the location SEVEN.

Lines 90 - 110 multiply the number 9 by 27 and place the result in the location NINE.

Line 120 stops the program's execution. At this point, you can examine the locations THREE, SEVEN and NINE to be sure they contain 81 ($51), 189 ($BD) and 243 ($F3), respectively.

Lines 130 - 260 are the multiply by 27 subroutine.

Homework.

Now you know how to write subroutines in 6502 assembly language. Subroutines are a powerful programming technique, and open doors into the Atari operating system (OS). Future installments of **Boot Camp** will show how to access these OS routines.

Until next time, write a subroutine that will add the X register to the Y register, placing the result in the accumulator. If the result of the add is greater than 255 (carry flag set), put the value $FF in the X register. Otherwise, set the X register to $00. Good luck! □

Send all letters to:

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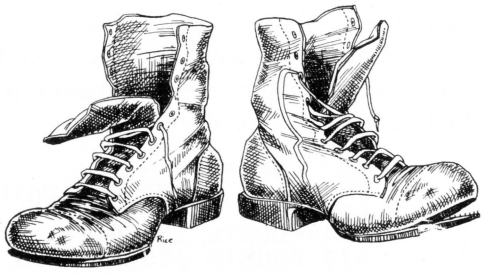

The Fergee File Printer

A major enhancement for "simple" word processors

40K Disk

by Dr. John C. Ferguson

The **Bank Street Writer** is an example of a simple word processor that is a near-perfect match for the Atari. Like the computer itself, it is rather inexpensive, a joy to use, and has a beautiful display. Unlike many other word processors, the **BSW** can be mastered in a few minutes. Even more important for the home user, it can be employed after several weeks of idleness with practically no effort needed to relearn the system.

With the beauty of simplicity, however, there are always trade-offs. I found that the **BSW**'s major limitations were not with the editing and filing functions, but with the printout. Printing a hard copy was awkward and required a great many keystrokes to initiate. Even after all this effort, there was only very limited capacity to control the format, and no provision at all to use the many extraordinary functions built into my NEC 8023AC printer. For example, if I wanted enhanced printing for a letter I had just typed, I would usually have to save the letter to disk, return to BASIC (perhaps inserting the cartridge), turn on the printer, LPRINT the enhanced print code, reboot the **BSW** (perhaps after removing the BASIC cartridge) and then go through the tedious procedure of initiating the printing. For reports, I could not use underline, tab stops, or the special Greek characters or numerical superscripts of the NEC 8023AC font!

Recognizing that work was almost always saved to disk anyway, and that the problem was not really in the word processing, I began to develop the present program as an easier method to format printing functions and to allow the use of some seldom-used characters as "tokens" to call forth the underline, special symbols, and control functions of the printer. As I got more into it, I found that there were almost an infinite number of additional enhancements that could be incorporated, including right justification of text and word counting. The result is the **Fergee File Printer**, which is a smorgasbord of the functions that I find most useful. It can easily be modified to add still others, but, again, there are always trade-offs between simplicity of use and complexity of control.

What FFP does.

The program is designed to be easy and fast. The major functions — file calling, token translation, word wrap, right justification and word counting — are all accomplished with machine language subroutines, thus execution will only be slowed by the speed of the printer itself, and the NEC 8023AC is quite fast. Actually, only a few lines identified by REM statements call on printer-specific functions, so the program can easily be modified to work with Epsons or other common printers.

When the program is run, a title page is briefly

displayed, showing the translations which are made in the file written with the word processor. These were selected to be easy to remember. Underline is set with "<" and cleared with ">". The "[" (like "C") causes the next letter typed to be interpreted as a CTRL character, and "]" (nearest the ATARI key) similarly causes the next letter to be interpreted as an ATARI character. A CTRL-ATARI character can likewise be called with "^" (above the ATARI key), while next to it "\" produces the ESC code. The **BSW** program's CTRL-C for centering text and the CTRL-1 for indenting are retained. If you would like the indent to be less than the preset eight spaces, a REM statement in the program tells how this function can be modified.

The redefined keys are lost for their normal functions, but their use while typing **BSW** files will now permit almost all of the printer function codes to be embedded in the text.

Working with the FFP.

While the program is displaying the title page, the computer is busily loading some of the machine language subroutines into memory. During this period you may, if you wish, remove the program disk from your drive and insert your disk of **BSW** files. When the poking is done, the display will shift to the primary menu for controlling printer format. The menu page also shows the preset default values. If these are satisfactory, simply push RETURN, and you will quickly see a display of the disk inventory with a code letter by each filename. Another push of RETURN will put you back in the menu, if you now decide you want to change something or try another disk. Otherwise, press the letter of the file you want printed, and it will rapidly load into memory.

You are now given a choice of either printing the file, viewing it (and possibly editing the starting or ending point) or returning again to the menu. A press of "P" will immediately initiate printing, provided you have turned on the printer. Thus, from booting the program, just three keystrokes will suffice to initiate printout of any file on the disk, unless you want to change any of the many options that are available in the menu. As soon as the file is dumped out to the printer's buffer, the screen will display a count of the words (actually spaces and EOL codes), and an option, either to print another copy or to return to the menu, will be given.

The menu shows a number of format changes that can be implemented, plus the current values. The initial default values are found in Lines 51 and 52 and can be altered to suit your own tastes.

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CIRCLE #148 ON READER SERVICE CARD

Any menu item may be changed by typing its number and RETURN. Some will toggle to the alternative value; others will call for you to enter some specific data. In either case, the new values will be shown in a redisplay of the menu screen, and they will remain in effect until changed again, or until the program is restarted.

Most menu items are sufficiently self-explanatory to need no comment, but a few do. In item 10, the set default of Right Justified calls forth a subroutine which inserts extra spaces within the lines, so that the text is neatly lined up on both the left and right margins, producing what — in many cases — is a more pleasing page appearance. I have also used it, in combination with changes in margin settings and line lengths, to produce dual column printing similar to this page. Note that there may be combinations of short line lengths, long words or non-printing control characters that will produce aberrant results, which can, infrequently, be a problem.

Item 12 allows you to define tab spacing at the time of printing. The tabs would be called by inserting the proper tokens in the text ("[I" for the NEC 8023). This greatly simplifies using the **BSW** for composing tables. A single default tab to position 50 has been included; I use this routinely for the date and signature lines in letters.

Item 13 allows other special codes to be sent out directly to the printer at the beginning of a session. I find that I often use it to call for 3⁶⁄₁₄₄-inch line spacing (about equivalent to 1½ spacing), which — together with a setting of 35 lines per page, a line length of 78 and elite type — makes a nice format.

Item 14 allows you to enter a header of up to 75 letters. If used, this will be printed out at the top of every page except page number 1 (Line 4020 prevents the header and page number from being printed on that page). Automatic page numbering in a choice of formats is provided in items 5 and 6. Be careful, when you print more than one file, that you set the correct first page number each time. If you want to set a new top-of-page position on the printer, turn it off and on again, to clear its memory.

After a file is called, you are given an option to see it displayed. If this is chosen, you will quickly see the first 500 characters, in a readable form with word wrap. You can toggle up and down, or from beginning to end, using the same controls as in the **BSW**, but note that, if the 500 characters contain an unusually large number of EOL codes, some of the display may scroll off of the screen. At any point, pressing "C" will produce a redisplay of slightly more than the 500 characters without word wrap, and with the EOL codes translated to a visible symbol. In this mode, a new beginning or ending point may be designated by moving the cursor to the proper location and pressing "B" or "E." You can also abort back to the word wrap display. From it, you can choose further changes, to print the file, or return to the menu and start all over again.

Et al.

While the **Fergee File Printer** was specifically written to enhance the **BSW**, it is certainly not limited to that function. It should work with files generated by most other word processors and editors. I have found it extremely useful in printing out listings of assembly language routines generated with the Atari Macro Assembler-Editor, and with the Atari Assembler Cartridge. Try it on anything you like — you may be surprised at the results.

The program is dimensioned for a 48K machine, a capacity which is usually recommended for word processing. It may be adapted for less memory by reducing the text buffer set in Line 44, eliminating REM statements and, if necessary, leaving out such subroutines as the title page (Lines 6000 - 6200) or view and editing (Lines 7000 - 8150). □

BASIC listing 1.

```
1 REM *
2 REM *  THE FERGEE FILE PRINTER
3 REM *
4 REM *              BY
5 REM *      DR. JOHN FERGUSON
6 REM
10 REM * This program will print files
        created with BANK STREET
        WRITER and a number of other
11 REM * editors and word processors.
        It will translate symbols
        embedded in text as shown
12 REM * on the title page, and print
        out the file on a NEC 8023AC
        printer using its special
13 REM * characters and controls.
        For other printers, change
        control codes in lines
14 REM * 3515-3570 and 4340. The
        underline is set by ASCII
        codes 27 and 88 found in
15 REM * lines 5030 and 5040. It is
        cleared with ASCII codes 27
        and 89 in line 5040. These
16 REM * may be substituted one for
        one with other codes if
        necessary.Change number of
17 REM * indent spaces by replacing
        the two 8's in line 5060.
        Change other defaults at 50.
18 REM
30 GOTO 6000
35 GRAPHICS 0
40 DIM TOP$(10),NF$(1),PAUSE$(1),EM$(1
0),H$(75),FONT$(5),S$(30),FILE$(15),R$
(1),TAB$(40),Z$(34)
44 MEM=16000
45 DIM T$(MEM),SPACE$(8),L$(150),A$(1)
,RJ$(203),N$(150),WCT$(27):RJ$(1)="":R
J$(203)="":RJ$(2)=RJ$
50 REM DEFAULTS
51 NO=1:MAR=8:LL=64:PG=1:TOP$="TOP (#.
)":TOP=1:NF$="Y":PAUSE$="N":NUM=55:EM$
="N":FONT$="PICA":H$="":S$=""
52 R$="Y":TAB$="050"
70 FOR N=0 TO 234:READ R:POKE 1536+N,R
:NEXT N:REM TRANSLATE SRT
75 FOR N=0 TO 202:READ R:POKE ADR(RJ$)
+N,R:NEXT N:REM RIGHT JUSTIFY SRT
76 FOR N=1 TO 34:READ R:Z$(N,N)=CHR$(R
):NEXT N
77 FOR N=1 TO 27:READ R:WCT$(N,N)=CHR$
(R):NEXT N:REM WORD COUNTER SRT
80 GRAPHICS 0
```

```
100 TRAP 40000:TRAP 1000:? "ß":? "ENTE
R NUMBER TO CHANGE OR RETURN":F=0:POKE
 1779,0:POKE 1780,0
105 ? :POKE 85,25:? "Default"
106 POKE 85,25:? "       "
110 ? " 1. Line spacing-          ";NO
120 ? " 2. Text lines per page-   ";NUM
130 ? " 3. Left margin-           ";MAR
140 ? " 4. Line length-           ";LL
150 ? " 5. Start with page-       ";PG
160 ? " 6. Page number, where-    ";TOP
$
170 ? " 7. Start at top-          ";NF$
180 ? " 8. Pause between pages-   ";PAU
SE$
190 ? " 9. Emphasized print-      ";EM$
200 ? "10. Right justified-       ";R$
210 ? "11. Font type-             ";FON
T$
220 ? "12. Tabs set at-           ";TAB
$:?
230 ? "13. Special codes:         ";S$:
?
240 ? "14. Header: ";H$
250 ? :INPUT D
255 TRAP 100
260 ON D GOTO 270,300,330,350,360,380,
430,440,460,465,470,600,650,700
270 IF NO=1 THEN NO=2:GOTO 100
271 IF NO=2 THEN NO=1:GOTO 100
300 ? "ß":? :? "HOW MANY TEXT LINES PE
R PAGE?":? :? "(Normal value is 55)":?
320 ? :? :INPUT NUM:GOTO 100
330 ? "ß":? :? "ENTER # SPACES FOR LEF
T MARGIN"
335 ? :INPUT MAR
340 GOTO 100
350 ? "ß":? :? "ENTER LINE LENGTH (1-1
50)"
351 ? :? "Normal values:";:POKE 85,20:
? "Pica          64"
352 POKE 85,20:? "Elite         78"
353 POKE 85,20:? "Proportional 100"
354 POKE 85,20:? "Condensed    118"
355 ? :? :INPUT LL:IF LL<1 OR LL>150 T
HEN 350
357 GOTO 100
360 ? "ß":? :? "ENTER NUMBER FOR FIRST
 PAGE":?
365 INPUT PG
370 GOTO 100
380 ? "ß":? :? "DO YOU WANT PAGES NUMB
ERED AS:"
385 ? :? "    (1) TOP           #."
390 ? "    (2) TOP     Page #"
395 ? "    (3) BOTTOM     - # -"
400 ? "    (4) NONE"
405 ? :INPUT D:ON D GOTO 410,415,420,4
25
410 TOP=1:TOP$="TOP (#.)":GOTO 100
415 TOP=2:TOP$="TOP (Page)":GOTO 100
420 TOP=3:TOP$="BOTTOM":GOTO 100
425 TOP=4:TOP$="NONE":GOTO 100
430 IF NF$="Y" THEN NF$="N":GOTO 100
431 IF NF$="N" THEN NF$="Y":GOTO 100
440 IF PAUSE$="Y" THEN PAUSE$="N":GOTO
 100
441 IF PAUSE$="N" THEN PAUSE$="Y":GOTO
 100
460 IF EM$="Y" THEN EM$="N":GOTO 100
461 IF EM$="N" THEN EM$="Y":GOTO 100
465 IF R$="Y" THEN R$="N":GOTO 100
466 IF R$="N" THEN R$="Y":GOTO 100
470 ? "ß":? :? "ENTER FONT TYPE"
475 ? :? "   (1) PICA"
480 ? "   (2) ELITE"
485 ? "   (3) PROPORTIONAL"
490 ? "   (4) CONDENSED"
495 ? :INPUT D:ON D GOTO 500,505,510,5
15
500 FONT$="PICA":GOTO 100
505 FONT$="ELITE":GOTO 100
510 FONT$="PROP.":GOTO 100
515 FONT$="COND.":GOTO 100
600 ? "ß":? :? "TABS NOW SET AT: ";TAB
$
610 ? :? :? "To change, enter new tab
positions    as three digit numbers se
parated by   commas.":? :?
620 INPUT T$:IF T$="" THEN 100
630 TAB$=T$:GOTO 100
650 ? "ß":? :? "ENTER SPECIAL PRINTER
CODES":? :? "(Do not use spaces or pun
ctuation)"
660 ? :? :INPUT S$:GOTO 100
700 ? "ß":? :? "ENTER HEADER: ":? :INP
UT H$:GOTO 100
1000 REM DISPLAY FILE LIST
1010 ? "ß"
1015 TRAP 100
1020 CLOSE #2:OPEN #2,6,0,"D:*.*":CLOS
E #1:OPEN #1,4,0,"K:"
1030 FOR X=1 TO 63:INPUT #2,L$
1040 POKE 85,1:IF L$(5,16)="FREE SECTO
RS" THEN 1080
1045 IF L$(11,13)="SYS" THEN X=X-1:GOT
O 1070
1050 IF X/2=INT(X/2) THEN POKE 85,20:?
 " ";
1060 ? " ";CHR$(64+X);" ";L$(3,17);" "
;:T$((X-1)*16+1,(X-1)*16+16)=L$
1070 NEXT X:GOTO 1030
1080 ? :? :? "TYPE LETTER OF FILE TO P
RINT OR"
1085 ? "RETURN FOR MENU":?
1090 GET #1,A:A=A-64:? CHR$(64+A)
1100 L$=T$((A-1)*16+3,(A-1)*16+13)
1110 FILE$="D:"
1120 FOR X=1 TO 8:IF L$(X,X)=" " THEN
1140
1130 FILE$(LEN(FILE$)+1)=L$(X,X)
1140 NEXT X
1150 FILE$(LEN(FILE$)+1)=".":FILE$(LEN
(FILE$)+1)=L$(9,11)
2000 REM GET FILE
2010 NUMBER=(SECT-1)*125:NUMHI=INT(NUM
BER/256):NUMLO=NUMBER-256*NUMHI
2060 T$=CHR$(0):T$(MEM)=CHR$(0):T$(2)=
T$
2070 TRAP 40000:TRAP 2300
2075 CLOSE #1:CLOSE #2:OPEN #2,6,0,FIL
E$
2080 INPUT #2,L$:SECT=VAL(L$(14,17))
2085 CLOSE #2
2090 NUMBER=(SECT-1)*125:NUMHI=INT(NUM
BER/256):NUMLO=NUMBER-256*NUMHI
2100 REM GET CIO
2110 IO=1:CLOSE #IO:OPEN #IO,4,0,FILE$
2120 IO=16*IO:TRAP 2200
2130 IOCB=832+IO:POKE IOCB+2,7
2140 ADRHI=INT(ADR(T$)/256)
2150 ADRLO=ADR(T$)-ADRHI*256
2160 POKE IOCB+4,ADRLO:POKE IOCB+5,ADR
HI:POKE IOCB+8,NUMLO:POKE IOCB+9,NUMHI
2170 I=USR(ADR("hhh▒LV▒"),IO)
2180 FOR N=1 TO 128:GET #1,B:T$(NUMBER
+N,NUMBER+N)=CHR$(B):NEXT N
2200 CLOSE #IO/16:T$=T$(1,NUMBER+N-1)
2210 IF T$(LEN(T$))<>CHR$(155) THEN T$
(LEN(T$)+1)=CHR$(155)
2220 GOTO 3000
2300 TRAP 40000:CLOSE #IO:? :? "ß CANN
OT LOAD FILE!":FOR N=1 TO 300:NEXT N:G
OTO 2000
3000 ? "ß":? :? :? "PRESS:  PRINT FILE
  (PRINTER ON?)"
3010 ? :? "          VIEW OR EDIT FILE"
3020 ? :? "          MENU"
3030 POKE 764,255
3040 IF PEEK(764)=10 THEN 3500
3050 IF PEEK(764)=16 THEN 7000
3060 IF PEEK(764)=37 THEN 100
3070 GOTO 3040
3500 REM SET PRINTER CONFIGURATION
3505 TRAP 40000:TRAP 4500:F=0
3510 CLOSE #2:OPEN #2,8,0,"P:"
3515 IF FONT$="PICA" THEN ? #2;"ESCN";:R
EM SET FONT
3520 IF FONT$="ELITE" THEN ? #2;"ESCE";
3525 IF FONT$="PROP." THEN ? #2;"ESCP";
3530 IF FONT$="COND." THEN ? #2;"ESCQ";
3540 ? #2;"ESCL";:IF MAR<100 THEN ? #2;"
0";:REM SET MARGIN
3545 IF MAR<10 THEN ? #2;"0";
3550 ? #2;MAR;
3560 IF EM$="Y" THEN ? #2;"ESC!";:REM SE
T ENHANCED MODE
```

```
3570 N$="{(":N$(LEN(N$)+1)=TAB$:N$(LEN
(N$)+1)=".":? #2;N$;:REM SET TABS
3580 ? #2;S$;:REM SPECIAL CODES
3590 POKE 1787,0:POKE 1789,LL+1
3600 PGS=PG:IF NF$="N" THEN 4110
3610 LINES=0
4000 REM TRANSLATE SECTION
4020 IF PGS=1 THEN ? #2:GOTO 4080
4030 ? #2;H$;:REM HEADER
4040 IF TOP>2 THEN ? #2:GOTO 4080
4050 FOR N=1 TO LL-LEN(H$)-2:? #2;" ";
:NEXT N
4060 IF TOP=1 THEN ? #2;PGS;"."
4070 IF TOP=2 THEN ? #2;"Page ";PGS
4080 ? #2:? #2:REM TOP SPACE
4110 E=LEN(T$)
4120 L$="":L$(150)="":L$(2)=L$
4125 N$=" ":N$(150)=" ":N$(2)=N$
4130 USED=PEEK(1787):F=F+USED:LIMIT=E-
F:IF LIMIT>255 THEN LIMIT=255
4135 IF PEEK(1791)<LL+1 THEN POKE 1785
,1
4140 IF LIMIT<0 THEN 4600:REM END
4150 POKE 1791,LIMIT
4155 X=USR(ADR(Z$),ADR(T$)+F,ADR(L$))
4160 X=USR(1536)
4165 X=USR(ADR(WCT$))
4170 IF R$="Y" THEN X=USR(ADR(RJ$),ADR
(N$))
4200 REM PRINT SECTION
4230 IF PEEK(1790)>0 THEN FOR N=1 TO P
EEK(1790):? #2;" ";:NEXT N
4240 IF PEEK(1787)<1 THEN POKE 1787,1
4250 IF R$<>"Y" THEN 4280
4260 IF PEEK(1782)=0 THEN ? #2:GOTO 43
10
4270 ? #2;L$(1,PEEK(1782)):GOTO 4310
4280 IF PEEK(1788)<1 THEN ? #2:GOTO 41
30
4285 IF L$=" " THEN ? #2:GOTO 4130
4300 ? #2;L$(1,PEEK(1788))
4310 IF NO=2 THEN ? #2:LINES=LINES+1:R
EM LINE SPACING
4320 LINES=LINES+1
4325 IF LINES<NUM THEN 4130
4330 IF TOP=3 THEN ? #2:FOR N=1 TO LL/
2-3:? #2;" ";:NEXT N:? #2;"- ";PGS;" -
"
4340 PGS=PGS+1:LINES=0:? #2;"■":REM TO
F
4350 IF PAUSE$="Y" THEN ? "■":? :? "PR
ESS RETURN WHEN PRINTER IS READY":? :?
 :INPUT L$
4355 TRAP 40000:TRAP 4000
4360 GOTO 4000
4500 TRAP 40000:? "■":? "TURN PRINTER
ON!"
4510 FOR N=1 TO 200:NEXT N:GOTO 3000
4600 CLOSE #2:POKE 764,255
4605 ? "■":? :? "WORD COUNT = ";PEEK(1
779)+256*PEEK(1780):POKE 1779,0:POKE 1
780,0:? :?
4610 ? :? "ENTER 'P' TO PRINT A SECOND
 COPY":? "OR RETURN FOR MENU":? :?
4620 TRAP 40000:TRAP 100
4630 INPUT L$:IF L$="P" THEN F=0:GOTO
3500
4640 GOTO 100
5000 DATA 104,174,253,6,216,172,251,6,
204,255,6,240,61,177,203,201,60,240,61
,201,62,240,72,201,93,240,83
5010 DATA 201,94,240,92,201,91,240,101
,201,92,240,111,201,3,240,114,201,9,24
0,119,201,155,240,20,172,252
5020 DATA 6,140,246,6,145,205,238,252,
6,238,251,6,202,208,193,76,192,6,238,2
45,6,238,251,6,76,229,6,169,27
5030 DATA 172,252,6,145,205,238,252,6,
169,88,232,208,212,169,27,172,252,6,14
5,205,238,252,6,169,89,232,208
5040 DATA 197,238,251,6,172,251,6,177,
203,24,105,128,144,184,238,251,6,172,2
51,6,177,203,24,105,64,144,171
5050 DATA 238,251,6,172,251,6,177,203,
56,233,64,76,51,6,169,27,232,232,76,51
,6,238,250,6,238,251,6,76,5,6
5060 DATA 173,254,6,24,105,8,141,254,6
,138,56,233,8,170,238,251,6,76,5,6,138
,74,141,254,6,96,206,252,6,172
5070 DATA 252,6,177,205,201,32,240,25,
201,27,208,9,238,251,6,206,246,6,206,2
46,6,201,128,144,3,206,251,6
5080 DATA 206,251,6,208,219,206,250,6,
240,208,96
5100 DATA 104,104,133,208,104,133,207,
173,246,6,208,1,96,206,245,6,208,9,238
,246,6,169,1,141,249,6,96,56
5110 DATA 237,252,6,133,209,169,0,205,
249,6,208,58,238,249,6,141,252,6,141,2
48,6,172,252,6,177,205,238,252
5120 DATA 6,172,248,6,145,207,238,248,
6,204,246,6,176,85,201,32,208,231,165,
209,240,227,198,209,169,32,172
5130 DATA 248,6,204,246,6,176,65,145,2
07,238,248,6,24,144,207,206,249,6,230,
209,173,246,6,141,248,6,238,248
5140 DATA 6,172,252,6,177,205,206,252,
6,172,248,6,145,207,206,248,6,48,25,20
1,32,208,234,165,209,240,230
5150 DATA 198,209,169,32,172,248,6,145
,207,206,248,6,48,3,24,144,213,160,0,1
77,207,145,205,200,204,246,6
5160 DATA 144,246,165,209,240,31,173,2
49,6,240,15,238,246,6,230,209,169,0,14
1,252,6,141,248,6,240,160,173
5170 DATA 246,6,141,248,6,141,252,6,20
8,166,96
5200 DATA 104,104,133,204,104,133,203,
104,133,206,104,133,205,169,0,141,250,
6,141,251
5210 DATA 6,141,252,6,141,254,6,141,24
6,6,141,245,6,96
5300 DATA 104,172,252,6,240,17,136,240
,6,177,205,201,32,208,247,238,243,6,20
8,3
5310 DATA 238,244,6,136,16,239,96
6000 REM TITLE PAGE
6005 GRAPHICS 0
6010 DL=PEEK(560)+256*PEEK(561)
6020 POKE DL+7,7:POKE DL+8,7:POKE DL+9
,6:POKE DL+10,7
6022 POKE 712,148:POKE 708,154
6030 POKE DL+27,65:POKE DL+28,PEEK(560
):POKE DL+28,PEEK(561)
6040 POKE 752,1:? :POKE 85,17:? "THE":
? :? :? :? :? :POKE 85,13:? "TRANSLATI
ONS"
6050 POKE 87,2:POSITION 14,4:? #6,"FER
GEE FILE"
6060 POSITION 16,6:? #6,"PRINTER"
6070 POKE 87,0:POKE 85,13:? "
"
6080 ? :POKE 85,7:? "CTRL C = CENTER L
INE"
6090 POKE 85,7:? "CTRL I = INDENT 8 SP
ACES"
6100 ? :POKE 85,9:? "{    = SET UNDERL
INE"
6110 POKE 85,9:? "}    = CLEAR UNDERLI
NE"
6120 POKE 85,9:? "]    = ATARI CHARACT
ER"
6130 POKE 85,9:? "[    = CTRL CHARACTE
R"
6140 POKE 85,9:? "^    = ATARI CTRL CH
ARACTER"
6150 POKE 85,9:? "\    = ESCAPE"
6200 GOTO 40
7000 REM VIEW FILE ROUTINE
7010 CLOSE #1:OPEN #1,12,0,"S:"
7020 B=1:F=0:G=0
7030 TRAP 40000:REM TRAP 7000
7040 ? "■";"PRESS:  UP, DOWN, BEGINNIN
G, END,"
7050 ? "          CHANGE,  PRINT,  MEN
U"
7055 ? "
":?
7060 POKE 764,255
7070 GOTO 8000
7080 IF PEEK(764)=58 AND LEN(T$)-B>500
 THEN B=F:GOTO 7040
7090 IF PEEK(764)=11 THEN B=B-G:GOTO 7
040
7100 IF PEEK(764)=21 THEN 7020
7110 IF PEEK(764)=42 THEN B=INT(LEN(T$
)/500)*500:GOTO 7040
```

```
7120 IF PEEK(764)=18 THEN 7500
7130 IF PEEK(764)=10 THEN 3500
7140 IF PEEK(764)=37 THEN POKE 764,255
:GOTO 100
7150 GOTO 7080
7500 REM EDIT PRINT FILE ROUTINE
7510 ? "R";"MOVE CURSOR AND SET:   BEG
INNING, END"
7520 ? "OR:   ABORT      (NOTE: EOL = ▙
 )"
7525 ? "──────────────────────────────
──────";:? :? :X=3:Y=18:IF B<1 THEN B=
1
7530 TRAP 7540:FOR N=B TO B+531:IF ASC
(T$(N,N))=155 THEN ? "▙";:NEXT N
7535 ? T$(N,N);:NEXT N
7540 POKE 764,255:POSITION X,Y:? "+";
7550 IF PEEK(764)=135 THEN X=X+1:GOTO
7620
7560 IF PEEK(764)=134 THEN X=X-1:GOTO
7620
7570 IF PEEK(764)=142 THEN Y=Y-1:GOTO
7620
7580 IF PEEK(764)=143 THEN Y=Y+1:GOTO
7620
7590 IF PEEK(764)=21 THEN 7700
7600 IF PEEK(764)=42 THEN 7800
7610 IF PEEK(764)=63 THEN 7000
7615 GOTO 7550
7620 IF X>38 THEN X=1
7630 IF X<1 THEN X=38
7640 IF Y>23 THEN Y=0
7650 IF Y<0 THEN Y=23
7660 GOTO 7540
7700 B=B+((Y-4)*38)+X-3:T$=T$(B,LEN(T$
)):GOTO 7000
7800 B=B+((Y-4)*38)+X-3:T$=T$(1,B):GOT
O 7000
8000 POKE 1787,0:POKE 1789,38
8010 IF B<2 THEN B=0:GOTO 8030
8020 IF T$(B,B)<>" " THEN B=B-1:GOTO 8
020
8030 E=LEN(T$):F=B:G=0
8040 FOR M=1 TO 16
8050 L$="":L$(80)="":L$(2)=L$
8060 USED=PEEK(1787):F=F+USED:G=G+USED
:LIMIT=E-F:IF LIMIT>255 THEN LIMIT=255
8070 IF LIMIT<0 THEN 7080
8080 POKE 1791,LIMIT
8090 X=USR(ADR(Z$),ADR(T$)+F,ADR(L$))
8100 X=USR(1536)
8110 IF PEEK(1782)=0 THEN ?
8120 IF PEEK(1788)=0 THEN ? :GOTO 8140
8125 IF PEEK(1790)>0 THEN FOR NN=1 TO
PEEK(1790):? " ";:NEXT NN
8130 ? L$(1,PEEK(1788))
8140 NEXT M
8150 GOTO 7080
```

●

CHECKSUM DATA

(see page 27)

```
1 DATA 226,269,230,340,748,997,600,772
,260,391,195,252,200,190,275,5945
30 DATA 647,171,233,651,971,284,13,342
,256,446,153,73,166,386,975,5767
106 DATA 395,909,514,633,731,191,691,4
97,960,340,278,971,973,242,943,9268
250 DATA 927,712,392,963,966,440,925,9
89,494,699,304,387,292,130,602,9222
355 DATA 882,709,120,862,708,75,403,29
1,144,102,57,428,921,186,96,5984
430 DATA 500,512,460,472,494,506,278,2
79,266,576,132,431,886,86,433,6311
505 DATA 307,296,267,102,789,925,486,8
15,646,729,581,370,836,576,864,8589
1040 DATA 203,117,225,280,812,991,167,
939,658,942,33,905,536,657,261,7726
2010 DATA 337,849,284,978,308,875,345,
364,614,773,829,536,826,276,689,8883
2180 DATA 202,788,779,712,448,945,804,
937,10,524,537,336,721,154,514,8411
3510 DATA 567,191,733,745,679,488,266,
698,403,63,239,10,902,737,770,7491
4020 DATA 992,69,8,339,872,437,600,690
,313,233,918,967,335,600,718,8091
4160 DATA 238,831,489,423,847,593,236,
891,158,908,79,881,869,552,566,8561
4330 DATA 525,971,962,300,726,462,611,
109,102,914,39,185,890,511,430,7737
5020 DATA 7,106,57,840,33,525,139,610,
39,69,965,515,572,788,104,5369
5200 DATA 888,731,349,712,866,62,924,4
31,607,468,448,771,314,818,195,8584
6090 DATA 549,987,781,868,23,822,581,6
36,622,786,211,452,705,203,886,9112
7060 DATA 21,736,783,868,536,35,561,53
4,486,750,391,824,431,894,409,8259
7535 DATA 133,821,132,136,141,139,565,
568,560,770,754,645,750,638,763,7515
7700 DATA 623,853,435,649,661,940,362,
939,146,397,608,717,240,489,461,8520
8125 DATA 553,613,517,752,2435
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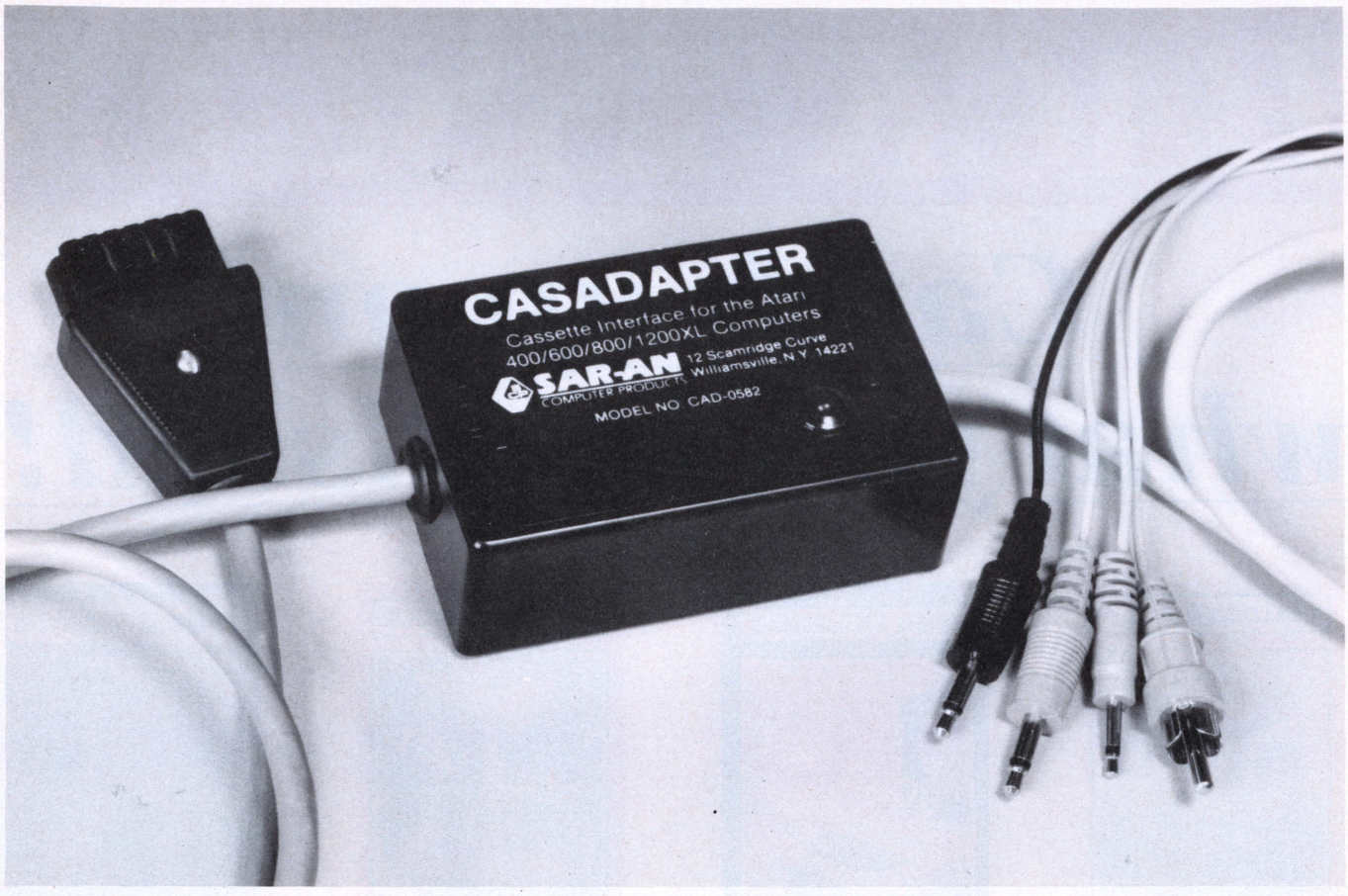

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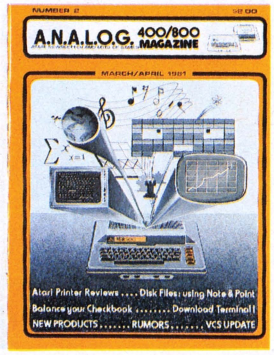

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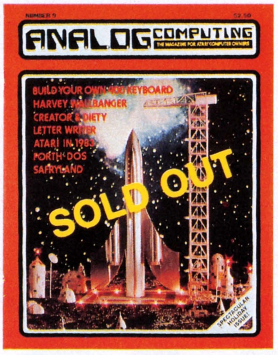

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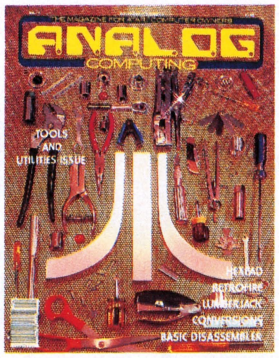

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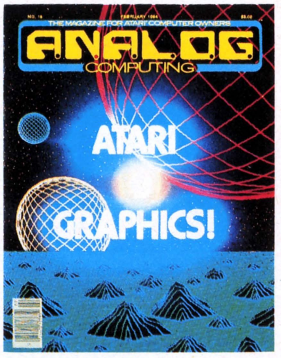

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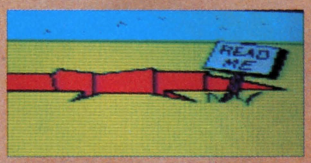

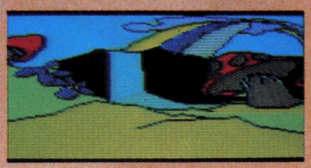

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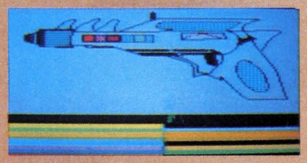

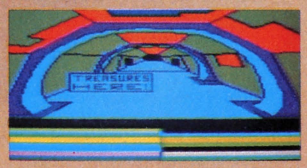

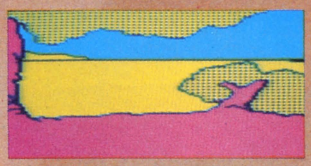

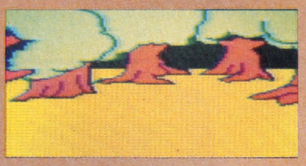

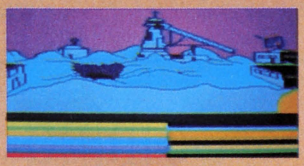

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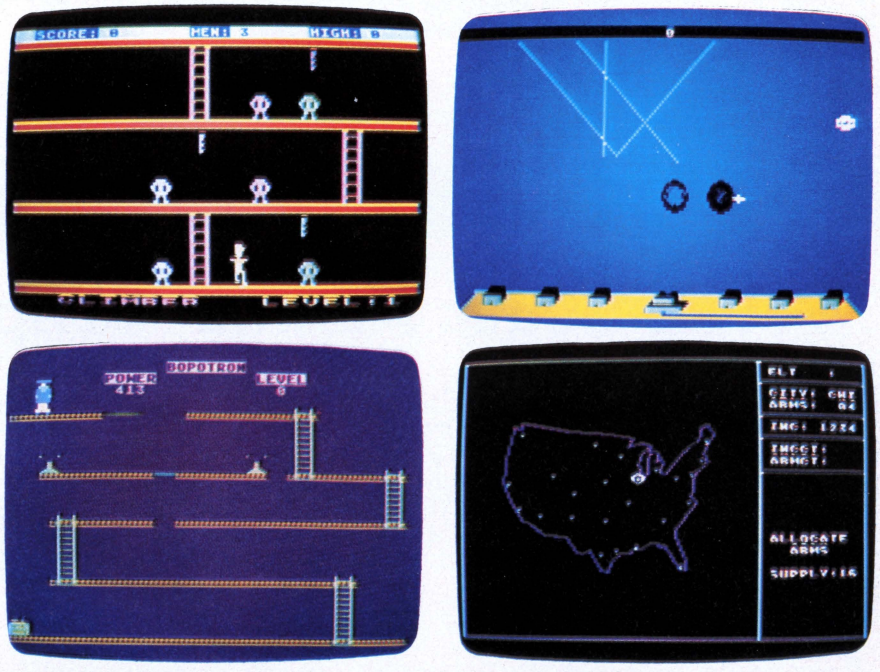

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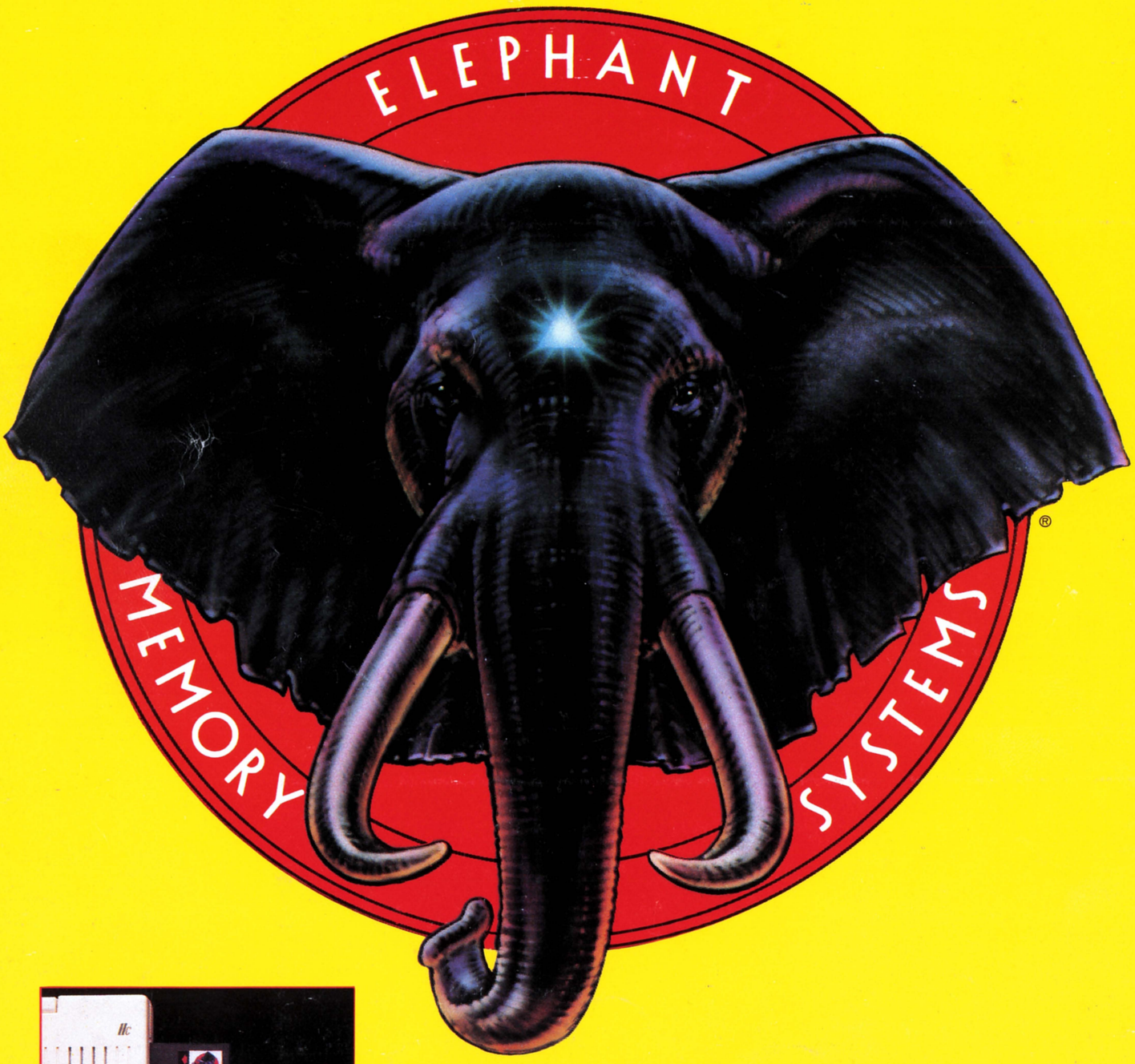

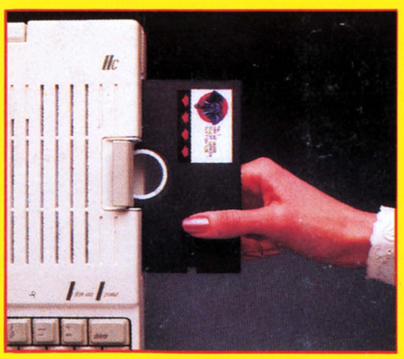

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